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



Project Title: *Ecoparque João Pessoa Landfill Gas Project*
Monitoring Period: *01/03/2023 to 26/11/2023 (Both days included)*
GS project ID: *GS12045*
Internal ID: *BELL_GS_VER_7524*
Customer: *Orizon Valorização de Resíduos S.A.*
Date: *16/10/2024~~08/07/2024~~*
Revision: *2.22*

SUMMARY			
Reference No.	Date (first version)	Version No.	Date (last version)
BELL_GS_VER_7524	06/06/2024	2.2	0016/0710/2024
GS4GG Verification			
GS4GG Certified Product (sought):		GHG Emission Reductions	
GS4GG SDG Impact Statement (sought):		Impact Certification	
General Information			
Client	Orizon Valorização de Resíduos S.A.		
Project Title	Ecoparque João Pessoa Landfill Gas Project		
Project Developer	Orizon Valorização de Resíduos S.A..		
Other Project Participants	First Climate (Switzerland) AG		
Project Location	João Pessoa, Paraíba State, Brazil		
Contact Person	Mr. Dalton Canelhas		
Monitoring Period	2 nd monitoring period under the GS4GG - from 01/03/2023 to 26/11/2023 (both days included)		
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 GHG Emission Reduction & Sequestration Product Requirements (version 2.3) Applied Methodology Version: ACM0001 Version 19.0 (latest version) - "Flaring or use of landfill gas".		GS4GG Sectoral Scope: 2 UNFCCC CDM Sectoral Scope: 1 and 13 Technical Area: 1.1 and 13.1 Date of project design certification: 20/10/2023 Project cycle: retroactive Scale of the project activity: small scale ¹	
Initial Monitoring Report Version: 1.0 Date: 20/03/2024		Final Monitoring Report Version: 2.2-3 Date: 0301/107/2024	
Transition Request Form + GS4GG PDD for the GS project activity Version 3.2 Date: 09/02/2024 GS Passport Version (if applicable): Not applicable.			
Estimated Annual Average SDG impacts as per the GS PDD:			

¹ Although the registered Transition Request Form + GS4GG PDD indicates that the project activity is a "large project", as per the definitions of the GS4GG Renewable Energy Activity Requirements, renewable energy projects with a maximum output capacity of 15 MW are defined as "small scale" projects.

SDG 7 (Affordable and clean energy): 39,297 MWh
 SDG 8 (Decent work and economic growth): 6 jobs/year
 SDG 13 (Climate action): 192,508 tCO₂e

SDG outcome achieved during this monitoring period:

SDG 7 (Affordable and clean energy): 29,471 MWh
 SDG 8 (Decent work and economic growth): 6 jobs/year
 SDG 13 (Climate action): 175,479-629 tCO₂e

Selected Sustainable Development Goals (SDGs): 7, 8, 13

Verification Summary

LGA Technological Center, S.A. (hereinafter referred to as "Applus+ Certification") was commissioned by the project developer Orizon Valorização de Resíduos S.A. to perform the 2nd periodic verification under the GS4GG (monitoring period from 01/03/2023 to 26/11/2023) of the GS4GG project activity titled "Ecoparque João Pessoa Landfill Gas Project" (Ref. No. GS 12045) (hereinafter referred to as "the GS project activity"). The GS project activity is registered as a Project Activity under the GS4GG and applies the baseline and monitoring methodology ACM0001 (Version 19.0) during its current GS crediting period (from 01/01/2021 to 26/11/2023).

Under conformance with Section 9.3 of the GS4GG Validation and Verification Standard (version 1.0), desk review, a remote site inspection and interviews with representatives of the project developer Orizon Valorização de Resíduos S.A. were conducted as part of the GS verification assessment in order to verify and confirm information and data included in the Monitoring Report and emission reductions spreadsheet.

The following documents were reviewed by Applus+ Certification:

- Transition Request Form + GS4GG PDD (Version 3.2), including the corresponding Validation Report;
- Monitoring Report from the previously concluded 1st periodic verification under the GS4GG (monitoring period from 01/01/2021 to 28/02/2023), including the corresponding Verification Report;
- Monitoring report from the 2nd periodic verification under the GS4GG (monitoring period from 01/03/2023 to 26/11/2023) (all versions);
- The applied CDM baseline and monitoring methodology (ACM0001 (Version 19.0) + the following applicable CDM methodological tools:
 - Tool 05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0).
 - Tool 06 - Project emissions from flaring (version 04.0).]
 - Tool 08 - Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0).
 - Tool 07 - Tool to calculate the emission factor for an electricity system (version 07.0).
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
- The GS4GG Validation and Verification Standard (version 1.0)
- The GS4GG Renewable Energy Activity Requirements (version 1.4)
- GS4GG GHG Emission Reduction & Sequestration Product Requirements (version 2.3)
- The GS4GG Principles and Requirements (version 1.2) and all other GS regulatory documents with relevant requirements, procedures and guidance;

- All information and references used for the determination of emission reductions and the other relevant SDGs for the GS project activity.

The project developer Orizon Valorização de Resíduos S.A. has operated the "Ecoparque João Pessoa Landfill Gas Project" which is located in the municipality of João Pessoa, Paraíba State, Brazil. During the considered monitoring period, the GS project activity encompassed collection of landfill gas (LFG) generated at the Ecoparque João Pessoa Landfill, destruction of LFG through flaring and also utilization of LFG as gaseous fuel for electricity generation. LFG (rich in methane (CH₄)) has been historically generated at the Ecoparque João Pessoa Landfill as a result of decay of organic fraction of MSW historically disposed at this landfill site.

The baseline scenario for the GS project activity represents the continuation of the pre-project situation at the Ecoparque João Pessoa Landfill: largest share of LFG generated at the landfill being directly emitted into the atmosphere through the pre-project passive and conventional LFG venting/combustion drains and through the surface of the landfill, with a small share of LFG being combusted/destroyed in such pre-project passive and conventional LFG venting/combustion drains. For electricity generation, the baseline scenario represents equivalent amount of electricity generated by the GS project activity being otherwise generated in existent electricity generation sources (including fossil fuel fired electricity generation facilities) connected to the National Electricity Grid of Brazil and addition of new electricity generation sources.

Applus+ Certification confirms that the project is implemented and in general has operated during the considered monitoring period in accordance with the Transition Request Form + GS4GG PDD for the GS project activity.

The monitoring plan complies with the applied CDM baseline and monitoring methodology ACM0001 (Version 19.0) + applicable CDM methodological tools and the GS4GG "Principles and Requirements" (version 1.2). The project's monitoring system (as described in the Transition Request Form + GS4GG PDD for the GS project activity) is in place and emission reductions achieved by the GS project activity during the considered monitoring period were correctly calculated and without any material misstatements.

Based on the information reviewed and evaluated, Applus+ Certification confirms that the operation of the GS project activity has promoted GHG emission reductions of 175,479-629 tCO₂e during the monitoring period 01/03/2023 to 26/11/2023 (both days included).

It is important to note that the GS project activity was previously registered under the CDM² as PROBIOGAS-JP – João Pessoa Landfill Gas Project (UNFCCC ref. 1165).

The scope of the GS verification assessment is defined as an independent and objective review of the Monitoring Report and emission reductions calculation spreadsheets, against all applicable principles, rules, requirements, procedures and guidelines from GS4GG and from UNFCCC/CDM. The GS Verification Report is finalized based on the assessment of the Monitoring Report for the considered monitoring period by applying standard auditing techniques (as also presented in the GS4GG Audit techniques template) including but not limited to document desk review, remote 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 performed GS verification assessment includes a total of 9 raised findings (Corrective Action Requests (CARs), Clarification Requests (CLs) and Forward Action Requests (FARs)) which were all sufficiently and satisfactorily addressed by the project developer: 9 (nine) CARs, 0 (zero) CL and 3 (three) FARs from validation³. The appointed Applus+ Certification's verification team was able to confirm that the project developer has successfully addressed all raised findings by modifying/amending/correcting the Monitoring Report accordingly and/or by providing adequate additional related explanations and documented evidence. Applus+ Certification therefore confirms that all raised findings were appropriately closed prior to submitting the request for issuance of GS VERs to the Gold Standard.

² PROBIOGAS-JP – João Pessoa Landfill Gas Project page at the UNFCCC website: <https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=1>

³ Appendix 1 also includes a FAR raised by the SustainCERT as part of the 1st round of Comments of the Performance Review.

Con formato: Fuente: (Predeterminada) Tahoma, 8,5 pto

Con formato: Fuente: (Predeterminada) Tahoma, 8,5 pto, Inglés (Estados Unidos)

Con formato: Justificado

Con formato: Fuente: (Predeterminada) Tahoma, 8,5 pto

Con formato: Fuente: (Predeterminada) Tahoma, 8,5 pto

Con formato: Fuente: 8,5 pto

As a summary of the verification, Applus+ Certification obtained sufficient evidence and a deemed appropriate documentation (including the appropriated completed Monitoring Report) for the determination of the project's fulfillment with all stated criteria.

ASSESSMENT TEAM		
Team Members	Type of Resource ⁴	Organization (for OEs)
Lead Auditor: Mr. Luis Filipe Tavares	☐ IR ☒ EI ☐ OE	-
Technical Expert: Mr. Luis Filipe Tavares	☐ IR ☒ EI ☐ OE	-
Auditor: Mr. Srikanth Meesa	☐ IR ☒ EI ☐ OE	-
Auditor in Training: Mr. Guilherme Horiuchi	☐ IR ☒ EI ☐ OE	-
Technical Reviewer: Mr. Miguel Cortés	☐ IR ☒ EI ☐ OE	-
Technical Reviewer: Mr. Karen Vega Nonalaya	☐ IR ☒ EI ☐ OE	-

ABBREVIATIONS	
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology Small Scale
BM	Build Margin
CAR	Corrective Action Request
CCEE	Câmara de Comercialização de Energia Elétrica (Electric Energy Trading Chamber)
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CL/CR	Clarification Request
CLT	Consolidação das Leis do Trabalho ("Consolidation of Labour Laws")
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DNA	CDM Designated National Authority
DOE	CDM Designated Operational Entity
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request

⁴ IR (Internal Resource); EI (External Individual); OE (Outsourced Entity)

GCC	Global Carbon Council
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
MP	Monitoring Plan
MR	Monitoring Report
NGO	Non-Governmental Organization
SDG	Sustainable Development Goal
TAC	Gold Standard Technical Advisory Committee
OM	Operational Margin
PCMSO	Programa de Controle Médico de Saúde Ocupacional (Medical Control Program of Occupational Health)
PDD	Project Design Document
PD	Project Developer
PGR	Programa de Gerenciamento de Riscos (Risk Management Program)
PRC	Post Registration Changes
REC	Renewable Energy Certificates
UNFCCC	United Nations Framework Convention for Climate Change
UV	Ultraviolet
VCS	Verified Carbon Standard
VVB	Validation and Verification Body
VVS	Validation and Verification Standard

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Appendix:

Appendix 1: Corrective Action Request / Clarification Request / Forward Action Request resolution table.

Appendix 2: Audit Team CVs.

1. Executive summary

1.1 Brief description of the GS project activity and performed verification assessment

Applus+ Certification was commissioned by the project developer Orizon Valorização de Resíduos S.A. to perform the 2nd periodic verification under the GS4GG of the GS project activity titled "Ecoparque João Pessoa Landfill project" (hereafter termed "the GS project activity"). The considered monitoring period encompasses the period from 01/03/2023 to 26/11/2023 (the second monitoring period within the project's current crediting period within the GS4GG (from 01/01/2021 to 26/11/2023) for which GS VERs will be claimed (since the project activity has already issued CERs up to 31/12/2020 under the CDM).

The GS project activity represents a previously registered Project Activity under the UNFCCC's Clean Development Mechanism (CDM) (formerly titled "PROBIOGAS-JP – João Pessoa Landfill Gas Project" (UNFCCC ref. 1165) for which transition into GS4GG is being claimed.

Applus+ Certification is accredited as a Validation and Verification Body (VVB) under the GS4GG (with an accreditation validity date of 30/06/2024) and as a Designated Operational Entity (DOE) by the UNFCCC, therefore meeting competence requirements as set out in ISO 14065 standard.

The project developer Orizon Valorização de Resíduos S.A. is responsible for the completion of the Monitoring Report.

The performed GS verification assessment is valid for the monitoring period from 01/03/2023 to 26/11/2023 (including both days) and it was performed on the basis of (i) comprehensive document review of the Monitoring Report ^{/04/} and Transition Request Form + GS4GG PDD for the GS project activity ^{/02/} + supporting documents; (ii) performance of remote inspection; (iii) conducted interviews with representatives of the project developer and project owner/operator Orizon Valorização de Resíduos S.A.; (iv) resolution of all identified outstanding issues (identified Corrective Action Requests (CARs) and Clarification Requests (CLs)) and, finally, (v) issuance of the Verification Report.

During the considered monitoring period, the project design encompassed (i) collection of LFG, (ii) utilization of share of collected LFG as gaseous fuel for electricity generation and (iii) destruction of share of collected LFG through combustion of LFG in a high temperature enclosed flare. During the whole considered monitoring period, the GS project activity therefore promoted reduction of emissions of the greenhouse gas (GHG) methane (CH₄) into the atmosphere (that would otherwise occur in the absence of the project activity (baseline scenario)). The GS project activity also promoted carbon dioxide (CO₂) emission reductions due to displacement of CO₂ emission intensive electricity by electricity generated by the GS project activity.

As confirmed by the Applus+ Certification's verification team, by the end of the considered monitoring period, the project's infrastructure was implemented as previously forecasted in the CDM PDD ^{/28/} and it currently encompasses, as methane destruction/utilization devices, one high temperature enclosed flare and 4 engine-generator sets.

As per the design of the GS project activity, the electricity demand of the GS 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 confirmed by the Applus+ Certification's verification team, the project's backup captive off-grid electricity generator (fueled by diesel) has not operated during the whole considered monitoring period.

The Ecoparque João Pessoa Landfill is located in Municipality of Jaboaão, in the Paraíba State, Brazil. The geographical coordinates of the project site are as follows:

- 7° 13' 4" S (-7.134)
- 34° 57' 23" W (-34.5723)

The Ecoparque João Pessoa Landfill started its Municipal Solid Waste (MSW) permanent disposal activities in the year 2003.

The landfill has received all necessary environmental licenses/permits for its operation. The landfill currently receives about 2,000 tons per day of MSW from the municipalities of Recife, João Pessoa and other nearby municipalities.

The Applus+ Certification's verification team has also confirmed that GHG emission reductions generated and/or yet to be generated by the 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 of the verification

The GS verification assessment shall ensure that reported GHG emission reductions for the considered monitoring period of the GS project activity are deemed complete and sufficiently accurate in order to be certified. The GS verification assessment, as an independent and objective review, shall verify and confirm whether the occurred implementation of the GS project activity as well as measures taken to monitor and report achieved emission reductions and the previously defined SDG goals of the GS project activity for a considered monitoring period comply with the Gold Standard for Global Goals "Principles and Requirements" (version 1.2) ^{/01/} and/or with all other GS regulatory documents with relevant requirements, procedures and guidance.

The verification assessment of the GS project activity is based on comprehensive and detailed review of information made available in (i) the Transition Request Form + GS4GG PDD for the GS project activity (version 3.2) ^{/02/}; (ii) the Monitoring Report ^{/04/} (incl. the emission reduction calculation spreadsheets that are enclosed to the Monitoring Report) for the considered monitoring period and (iii) all other supporting documents made available to the Applus+ Certification verification team + review of information collected through performance of interviews.

Furthermore, as part of the verification assessment, publicly available information is considered and reviewed as far as available and required.

The verification assessment was carried out on the basis of the following rules and requirements that are applicable for the GS project activity:

- Article 12 of the Kyoto Protocol ^{/07/},
- Guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 ^{/08/} and subsequent decisions made by the Executive Board and COP/MOP,
- Other relevant rules, including applicable and valid host country legislation/regulations,

- The UNFCCC CDM validation and verification standard for project activities (CDM-VVS-PA) (version 03.0) ^{/56/},
- The GS4GG Validation and Verification Standard (version 1.0) ^{/46/},
- The monitoring plan of the Transition Request Form + GS4GG PDD for the GS project activity (version 3.2, dated 09/02/2024) ^{/02/}.
- Monitoring report from the 1st periodic verification under the GS4GG (monitoring period from 01/01/2021 to 28/02/2023), including the corresponding Verification Report ^{/45/},
- The CDM baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas" (Version 19.0) ^{/06/},
- Monitoring Report for the considered monitoring period (all versions) ^{/04/},
- The following CDM methodological tools, which are referred in the Monitoring Report:
 - "Emissions from solid waste disposal sites" (version 08.0) ^{/12/}
 - "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}
 - "Project emissions from flaring" (version 04.0) ^{/10/}
 - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{/14/}
 - "Tool to calculate the emission factor for an electricity system" (version 07.0) ^{/15/}

1.3 Verification process

The verification process is based on applicable verification guidelines described in the GS4GG Validation and Verification Standard (version 1.0) ^{/46/}. In addition to that, standard auditing techniques were applied by the appointed Applus+ Certification's Verification team. As part of the verification assessment, the Applus+ Certification's Verification team initially performed a desk review on all verification related documents, followed by the performance of remote inspection to the project site and conduction of interviews with representatives of the project developer Orizon Valorização de Resíduos S.A. in order to review the project implementation and its operation.

For all identified inconsistencies and lack of clarity, related findings (list of outstanding issues) are raised. The next steps are to close out the findings through direct communication with representatives of the project developer and receive, if applicable, updated version of the Monitoring Report ^{/04/} and/or supporting documents and finally preparing the Verification Report. The draft version of the Verification Report undergoes a technical review by Applus+ prior to its submission to the GS4GG/SustainCert.

1.4 Verification assessment conclusion

As part of the conducted GS verification assessment, the Applus+ Certification's verification team identified a set of outstanding issues that were appropriately/sufficiently addressed and resolved by the project developer Orizon Valorização de Resíduos S.A. (*inter alia* through revision of the Monitoring Report ^{/04/} and supporting documents) as part of the performed verification assessment.

Also, as an outcome of the performed GS verification assessment, the Applus+ Certification's verification team was able to confirm that GHG emission reductions achieved by the GS project activity during the considered monitoring period are correctly calculated and appropriately reported in the latest version of the Monitoring Report ^{/04/}.

All sections of the Monitoring Report were also confirmed as being appropriately completed. As outlined in such latest version of the Monitoring Report ^{/04/}, reported emission reductions are confirmed as being correctly determined and under conformance with applicable monitoring requirements and GHG calculation approaches as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and applied CDM baseline and monitoring methodology and methodological tools ^{/10/ /11/ /12/ /14/ /15/}.

Therefore, Applus+ certifies that emission reductions achieved by the GS project activity during the monitoring period from 01/03/2023 to 26/11/2023 (including both days) are correctly determined and reported as 175,479-629 tCO₂e. Applus+ Certification therefore requests the GS4GG/SustainCert to issue an equivalent amount of Gold Standard VERs (GS VERs) for the GS project activity.

2. Verification team

2.1 Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Lead Auditor / Technical Expert	EI	Tavares	Luis Filipe	Applus+ Certification	X		X	X
2.	Auditor	EI	Meesa	Srikanth	Applus+ Certification	X		X	X

3.	Auditor in Training	EI	Horiuchi	Guilherme	Applus+ Certification	X		X	X
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EI: External individual

Demonstration how the appointed verification team meets the competence required for the performance of the verification assessment is included in Appendix 2.

2.2 Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer/ Technical Expert	EI	Cortés	Miguel	Applus+ Certification
2.	Technical reviewer/ Technical Expert	EI	Nonalaya	Karen Vega	Applus+ Certification
3.	Approver	IR	Calle	Agustin	Applus+ Certification

IR: Internal resource; EI: External individual

Demonstration of how the appointed technical reviewer and approver of the Verification Report meet the competence required for the performance of the verification assessment is included in Appendix 2.

3. Application of materiality

3.1 Consideration of materiality in planning the verification

By acknowledging that, as an outcome of the GS verification assessment, an individual or an aggregate of undetected error(s), omission(s) and misinterpretation(s) could potentially undermine the possibility of achieving a verification opinion under reasonable and fair level assurance; applicable aspects and requirements of the concept of materiality were thus effectively considered in the context of the verification assessment as required/established by both Section 9.6 of the GS4GG Validation and Verification Standard (version 1.0) ^{/46/} and the CDM Guidance "Guideline - Application of materiality in verification" (version 02.0) ^{/29/}.

In the context of the verification planning, while aiming to minimize the risk of material discrepancies not being detected during the verification assessment (detection risk), the Applus+ Certification's verification team performed an identification and analysis of risks that could potentially lead to quantitative material errors, omissions and misstatements in its verification opinion.

Furthermore, the identification of actions to be performed by the appointed Applus+ Certification's verification team during the verification assessment as related responses/actions to such identified risks were also included/considered in both the verification planning phase and

later performed in the subsequent phases of the verification assessments (e.g. document desk review, interviews with representatives of the project developers, identification/addressing of findings and reporting).

In order to ensure a deemed complete, transparent and timely execution of the verification assessment, the appointed Applus+ Certification's verification team (that holds sufficient experience and expertise with performance of verification assessments for project-based initiatives encompassing LFG collection and destruction/utilization of LFG under GS4GG) planned a complete sequence of assessment events that were regarded as required to detect existent major potential material errors, omissions and discrepancies and, upon addressing of such outstanding issues, arrive at a substantiated and reasonable final verification opinion (with the risks that could lead to quantitative material errors, omissions and misstatements in its verification opinion being thus sufficiently identified and addressed).

By taking into account applicable guidance from both the CDM guidance "Guideline - Application of materiality in verification" (version 02.0) ^{/29/}, the CDM validation and verification standard for project activities (CDM-VVS-PA) (version 03.0) ^{/56/} and the GS4GG Validation and Verification Standard (version 1.0) ^{/46/}, the threshold of materiality for the performed verification assessment was evaluated and it was concluded that such threshold applicable to the GS project activity (based on actual emission reductions reported as achieved during the considered monitoring period as per the initial version of the Monitoring Report and the length of the considered monitoring period) is appropriately defined as 2.0%⁵.

As part of the verification planning, no sampling approach was considered as required for monitoring and cross-checking of data against primary data source (no sampling-based monitoring or no data cross-checking based on sampling⁶). While it was later confirmed that no sampling approach was indeed required in the context of assessment of monitoring data, risks related to sampling for these aspects were thus not identified and, therefore, no design of sampling plan for addressing such aspects was considered in the context of the verification planning.

The project developer and project operator/owner Orizon Valorização de Resíduos S.A. did not apply any sampling plan to determine data and parameters monitored during the considered monitoring period. The Applus+ Certification's verification team has checked all the documents and no sampling plan was required.

The table below summarizes the following elements of the verification planning:

⁵ As indicated in the Transition Request Form + GS4GG PDD for the GS project activity, average annual emission reductions to be achieved by the GS project activity within its current 1st GS crediting period ~~were~~ ex-ante estimated as 244,222 tCO₂e/year. A threshold of materiality of 2.0% is thus selected (resulting from the average annual ex-ante estimation of emission reductions (value lower than 300,000 tCO₂e/year)).

⁶ The Applus+ Certification's verification team was also able to confirm that no sampling approach for monitoring and cross-checking of monitoring data against primary data source was applicable/required for the verification assessment covered by this Verification Report since:

- (i) as per the monitoring and GHG calculation approaches applied for the GS project activity (as established in the Transition Request Form + GS4GG PDD and applied CDM baseline and monitoring methodology + applicable methodological tools), no sampling procedure and no sampling-based monitoring are valid/required for the determination of emission reductions achieved by the GS project activity during a given monitoring period.
- (ii) there is a possibility for cross-checking/reproducing all reported LFG and flaring/utilization measurement records valid for the considered monitoring period against the related primary data sources (with all reported related monitoring data being cross-checked/reproduced (instead of having selected samples of data being cross-checked/reproduced)). Further related assessment details valid for the performed verification assessment encompassed by this Verification Report are included in Section 5.6, under *Data authenticity checking*.

- Identified risks that could lead to material errors, omissions or misstatements (including their assessment details)
- Summary of the responses/actions to such identified risks that were later considered during the performance of the verification assessment.

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Inadequate installation/configuration or malfunction in measuring instruments/equipment (e.g. insufficient accuracy or inappropriateness of installed equipment/instruments)	High	Potential generation of measurement and data errors/inconstancies due to inappropriate installation/configuration or malfunction in related measuring instruments/equipment. This risk might lead to material error in calculation and reporting of achieved emission reductions.	The Applus+ Certification's verification team shall confirm whether modern/state-of-the art and/or best-practice monitoring instruments/equipment are appropriately installed/configured as part of the implementation and operation of the GS project activity. By considering the significantly rate of monitoring data being recorded (LFG and flaring/utilization related measurements being recorded/reported with an every-minute frequency), ideally, it is expected that a reliable process control automation is in place for typical GS project activities encompassing LFG collection and destruction/utilization. Moreover, it should be confirmed whether trained personnel staff are in charge of the operation of the project's monitoring system and that there are related QA/QC procedures in place.
2.	Inadequate accuracy and lack of correctness of monitoring data and or evaluations supplied by independent 3 rd parties (e.g. measurements of residual outgoing	High	Potential generation of measurement and data errors/inconsistencies due to inappropriate installation / configuration or malfunction in related measuring instruments	The Applus+ Certification's verification team shall confirm whether all measurements performed by independent 3rd parties are performed by company (ies) with

	methane in the flares for the determination of project emissions of methane through the flares)		and/or inappropriate evaluation procedures being applied by company (ies) in charge of related measurements and evaluations to be performed by independent 3 rd party inspection service company(ies). These risks might lead to material error in calculation/determination and reporting of baseline emissions.	required accreditation. It shall also be confirmed whether modern/state-of-the art and/or best-practice equipment/instruments and/or procedures are appropriately applied for related 3rd party measurements and/or evaluations. Moreover, it should be confirmed whether there are related QA/QC procedures in place. Finally, it shall also be ensured that, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. measurements of residual outgoing methane in the flares for the determination of project emissions of methane through the flares valid for a particular time period); no emission reductions for such particular time period are accounted/claimed under such circumstances (thus minimizing risks of overestimations of claimed GHG emission reductions).
3.	Inadequate installation/configuration or malfunction in installation/configuration of data processing/management equipment such as programmable logic controller unit (PLC unit) and data storage infrastructure (database for monitoring records).	High	Potential recording and reporting of monitoring data with errors and/or inconsistencies due to inappropriate installation/configuration or malfunction in related data management/processing equipment (PLC unit and/or database for monitoring records). This risk might lead to material error in calculation and reporting of achieved emission reductions.	The Applus+ Certification's verification team shall confirm whether modern, state-of-the art and best practice data management/processing infrastructure (PLC unit and database for monitoring records) is appropriately installed/configured as part of the implementation and operation of the GS project activity.

4.	Errors and inconsistencies in the procedure(s) of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions.	High	Potential recording and reporting of monitoring data with errors and/or inconsistencies due to occurrence of errors and inconsistencies in the procedure(s) of transferring of monitoring data to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions. This risk might lead to material error in calculation and reporting of achieved emission reductions.	The Applus+ Certification's verification team shall confirm whether appropriate and reliable procedure(s) of transferring monitoring data to monthly and summarized aggregated reporting forms/spreadsheets are in place.
5.	Errors and/or inconsistencies (e.g. human mistakes) in the procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions + reporting of such information in the Monitoring Report ^{/04/} .	High	Potential reporting of monitoring data and GHG calculations with errors and/or inconsistencies due to occurrence of errors and/or inconsistencies (e.g. human mistakes) in the procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions + reporting of such information in the Monitoring Report ^{/04/} . This risk might lead to material error in calculation and reporting of achieved emission reductions.	The Applus+ Certification's verification team shall confirm whether appropriate and reliable procedure(s) for entering the values of ex-ante determined parameters and entering/applying calculation formulas to monthly and summarized aggregated reporting forms/spreadsheets used for the determination of emission reductions are in place. The Applus+ Certification's verification team shall also confirm whether appropriate and reliable procedure(s) for checking the correctness of such data entries and/or application of calculation formulas are in place. This may be checked through evaluation of the project's related working/operational procedures (incl. QA/QC procedures) and through performance of recalculations and detailed inspection in such

				forms/spreadsheets by the verification team. Moreover, it should be confirmed whether trained personnel staff are in charge of entering the values of ex-ante determined parameters and entering/applying calculation formulas to such monthly and summarized aggregated reporting forms/spreadsheets.
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3.2 Consideration of materiality in conducting the verification

By taking into account applicable guidance from the CDM “Guideline – Application of materiality in verifications” (version 02.0) ^{/29/}, materiality was considered in conducting the verification.

As part of the performance of the verification assessment, the previously elaborated verification plan was applied without being revised for having potentially detected errors, omissions or misstatements being addressed through additional (and not previously planned) audit/verification procedures during the sub-sequential phases of the performance of verification assessment (e.g. document desk review, interviews with representatives of the project developer, identification and resolution of outstanding issues (CARs and CLs), etc.).

As per the monitoring and QA/QC procedures adopted as part of operation of the GS project activity, as confirmed by the Applus+ Certification’s verification team, emission reductions are per se accounted only for monitoring data that is deemed correct, authentic and reliable (based proof of measurements performed by calibrated and well-maintained monitoring equipment/instruments, checking of correctness and reasonability in recorded/reported monitoring data (e.g. data values within an acceptable/plausible range)).

In this context it is also crucial to note that, as also confirmed by the Applus+ Certification’s verification team, in case of identification of uncertainties related to correctness/reasonability of reported monitoring data for a particular time period (e.g. continuous measurements related monitoring for a particular minute within the considered monitoring period) as part of the monitoring of the GS project activity, the procedure applied by the project developer Orizon Valorização de Resíduos S.A. ensures that no emission reductions for such particular time period are therefore claimed/accounted under such circumstances (thus minimizing risks of overestimations or miscalculations of claimed GHG emission reductions).

Furthermore, it is also crucial to note that as per the monitoring and GHG calculation approaches that are valid for the GS project activity (as established in the Transition Request Form + GS4GG PDD ^{/02/} and applied CDM baseline and monitoring methodology + applicable methodological tools) ^{/10/ /11/ /12/ /14/ /15/} no sampling procedure and no sampling-based monitoring are valid/required for the determination of achieved emission reductions. Finally, it is also relevant to note that, as a response to risks identified during the planning phase of the verification, for minimizing the risks of having incorrect monitoring data (measurement records) being considered in the context of the calculation and reporting of achieved emission reductions (in a way that calculated emission reductions are overestimated), the verification assessment encompassed the



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performance of a checking of authenticity of all LFG and LFG flaring/utilization related monitoring data.

Performed data authentic check:

As part of the performed verification assessment, the Applus+ Certification's verification team was able to realize/confirm that the emission reductions calculation spreadsheets ^{/05/} completed by the project developer Orizon Valorização de Resíduos S.A. are basically MS-Excel spreadsheets that, in theory, could have reported data being easily edited/modified (intentionally or unintentionally). Thus, these spreadsheets, if inappropriately edited, could potentially tamper reported monitoring records, thus resulting in unreal and incorrect calculation and reporting of emission reductions achieved by the GS project activity during the considered monitoring period.

In order to ensure that all emission reductions calculations are entirely and correctly based on authentic, real and not modified monitoring records valid for the considered monitoring period, a data authentic checking was therefore performed as part of the verification assessment. Such checking aimed to ensure that only authentic and unmodified monitoring data records were indeed used by the project developer for performing the emission reductions calculation for the considered monitoring period (thus ensuring that measurement records made available in the MS-Excel format "raw data" input files ^{/41/} and measurement records reported in the emission reduction spreadsheets were not intentionally or unintentionally edited/modified during the generation or handling of these files). Assessment details for the performed data authenticity check are included in Section 5.6, under "Data authenticity checking".

4. Means of verification

4.1 Desk/document review

The Applus+ Certification conducted a comprehensive and detailed desk review of all documents initially provided by representatives of the project developer Orizon Valorização de Resíduos S.A. + other publicly available documents that are relevant for the verification assessment. The main assessed documents are listed below:

- Monitoring report from the previously concluded 1st periodic verification under the GS4GG (monitoring period from 01/01/2021 to 28/02/2023), including the corresponding Verification Report ^{/45/}.
- The Transition Request Form + GS4GG PDD (Version 3.2) ^{/02/} for the GS project activity, including the corresponding Validation Report.
- The initial version of the Monitoring Report ^{/04/} for the 2nd period verification of the GS project activity (under the GS4GG).
- The applied CDM baseline and monitoring methodology ACM0001 "Flaring or use of landfill gas" (Version 19.0) ^{/06/} + the following methodological tools:
 - "Emissions from solid waste disposal sites" (Version 08.0) ^{/12/}
 - "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0) ^{/11/}
 - "Project emissions from flaring" (Version 04.0) ^{/10/}
 - "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0) ^{/14/}

- “Tool to calculate the emission factor for an electricity system” (Version 07.0) ^{/15/}
- Relevant decisions, clarifications and guidance from the CMP of the Kyoto Protocol and the CDM Executive Board.
- GS4GG Validation and Verification Standard (version 1.0) ^{/46/}.
- GS4GG Site Visit and Remote Audit Requirements and Procedures (version 2.0) and the GS4GG Rule Update - Applicability of Minimum Site Visit Requirements by VVB ^{/62/}
- Any other information and references relevant to the GS project activity resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).
- Certificates of calibration for monitoring instruments utilized during the considered monitoring period.
- Specification sheets for monitoring instruments and main equipment which are part of the GS project activity.
- Monthly spreadsheets containing all LFG and electricity generation related monitoring measurements for the considered monitoring period.
- Registries of relevant operational events which occurred during the considered monitoring period (including temporary interruptions in the operation of the GS project activity)

Besides the above-mentioned documents, the Applus+ Certification’s verification team also assessed other additional documents that were required to assess the accuracy of the emission reduction calculations presented in the Monitoring Report ^{/04/}.

A detailed list of all assessed documents is included in Section 10 (REFERENCES) of this Verification Report.

The performed desk review for the initial version of the Monitoring Report included the following assessments:

- a comprehensive review of data and information presented in the Monitoring Report ^{/04/} to verify their overall completeness.
- a comprehensive review of the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} and applied CDM baseline and monitoring methodology (ACM0001 (Version 19.0) ^{/06/} + applicable methodological tools, paying particular attention to the required frequency for measuring, recording and reporting of related monitoring data. Requirements related to the quality of monitoring instruments/equipment (including calibration requirements, and the QA/QC procedures) were also observed.
- an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of GHG emission reductions.

Through the process of verification, the latest version of the Monitoring Report ^{/04/} + supporting documents were evaluated to confirm the actions taken by the project developer to address eventually raised CARs and CLs. Applus+ Certification also reviewed the latest version of the Monitoring Report ^{/04/} to confirm that all required corrections and reporting improvements were incorporated.

4.2 Remote inspection

No on-site inspection (with physical presence of the Applus+ Certification's verification team) was conducted as part of the performed verification assessment.

Applus+ Certification's verification team has applied procedures and requirements from applicable guidance of the GS4GG Site Visit and Remote Audit Requirements and Procedures (version 2.0) ^{/62/} to confirm the applicability of the remote inspection in the current monitoring period by attending the minimum physical site visit requirements as follows:

Requirements	Assessment and condition
"3.1. Frequency of physical site visits 3.1.1. At minimum, the VVB shall conduct physical site visit within two years of project start date; and"	Although the project start date under the CDM was previously defined as 20/01/2008 (as indicated in the registered PDD for the project activity under the CDM ^{/28/}) the project activity was only recently registered/transitioned under the GS4GG (upon approval of the transition from the CDM to the GS4GG on 12/03/2024). By also considering that a site visit was recently performed by the Applus+ Certification's team (which was appointed to perform the joint validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1 st monitoring period of the project activity under the GS4GG (from 01/01/2021 to 28/02/2023)) on 18/05/2023, the quoted requirement is thus not applicable for the present verification assessment for a transitioned GS project activity.
"3.1.2. Once within every three years after the first physical site visit date"	As confirmed by the Applus+ Certification's verification team by assessing the Verification Report for the 1 st verification assessment for the project activity under the GS4GG ^{/45/} (monitoring period from 01/01/2021 to 28/02/2023), the last physical site visit performed to the project site is dated 18/05/2023. The quoted requirement is thus not applicable for the present verification assessment.
"3.2 Audit events 3.2.1. A physical site visit by VVB is not mandatory at the validation (Design Certification or Design Certification Renewal) of a project"	Not applicable as this assessment refers to the 2 nd verification period and not the validation process.
"3.2.2 A physical site visit by VVB is mandatory at the first verification of a project"	As confirmed by the Applus+ Certification's verification team by assessing the Verification Report for the 1 st verification assessment for the project activity under the GS4GG ^{/45/} (monitoring period from 01/01/2021 to 28/02/2023), the last physical site visit to the project site was performed on 18/05/2023. As a conclusion, the quoted requirement was confirmed by Applus+ Certification's verification team as being met.

<i>"3.2.3 The first physical site visit may combine both validation and verification audits if the project developer and VVB combine Design Certification with the first verification and Performance Review".</i>	As confirmed by the Applus+ Certification's verification team, the last site visit to the project site (performed on 18/05/2023) combined both the validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1st monitoring period of the project activity under the GS4GG). As a conclusion, the quoted requirement was confirmed by Applus+ Certification's verification team as being met.
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The Applus+ Certification's verification team performed its document review and interviews with representatives of the project developer (of which details are included in Sections 4.1 and 4.3 respectively) by incorporating the following additional checking/assessment (complementary auditing measure):

- Remotely (online) watching by the Applus+ Certification's verification team of set of sequential live videos (movies) + photographs (pictures) produced/generated by member of project operational staff located on-site (allowing remote complete and comprehensive assessment and observations for the GS project activity).

Upon previous request from the Applus+ Certification's verification team, the representatives of the project developer organized the production of a sufficiently complete set of sequential live videos (movies) + photographs (pictures) ^{/49/} produced/generated online in the project site with the goal of making it possible to the Applus+ Certification's verification team to remotely assess and confirm the implementation and operation of the GS project activity (as if the verification team were on-site).

The set of sequential live videos (movies) + photographs (pictures) ^{/49/} were watched/visualized online by the Applus+ Certification's verification team while being produced/generated on 08/05/2024 and were later fully made available to Applus+ Certification for further assessment/watching and archiving as auditing evidence. By watching/visualizing (more than once) the content of the set of sequential live videos (movies) + photographs (pictures) ^{/49/}, the Applus+ Certification's verification team was able to have a comprehensive and complete remote assessment of the GS project activity as if the team were on-site. The produced set of sequential live videos (movies) + photographs (pictures) ^{/49/} (recorded as .mp4 video format files and .jpg picture format) include/show the following:

- Details of the whole project's infrastructure promoting collection and utilization of LFG for electricity generation (e.g. LFG pipeline, centrifugal blower, flare, engine-generators and other equipment of the project's electricity generation infrastructure, etc.);
- Details about all monitoring instruments/equipment (of which the latest version of the Monitoring Report ^{/1/} refers to),
- Details about the functioning of the process for gathering, recording and archiving of monitoring data (i.e. LFG related measurements, measurement records for electricity generated and grid-electricity consumed by the GS project activity).

Watching and visualizing the set of sequential live videos (movies) + photographs (pictures) ^{/49/} sufficiently and successfully provided to the appointed Applus+ Certification's verification team the following assessment outcomes &/:

- The possibility of having a complete and transparent remote visualization of the current implementation and operation of the GS project activity (as if the Applus+ Certification's verification team were on site), thus making it possible to the verification team to confirm the correctness of information included in the Monitoring Report ^{/4/} and Transition Request Form + GS4GG PDD for the GS project activity ^{/2/} regarding both the implementation of the GS project activity (project design) and its operation.
- The possibility of having a complete and transparent remote visualization of the implementation and operation of available information and data flows/procedures for generating, gathering, aggregation, recording and reporting data for the ex-post determined monitoring parameters (as if the Applus+ Certification's verification team were on site), thus making it possible to the verification team to confirm the correctness and appropriateness of related data gathering, processing, recording and data recording by the available project's monitoring infrastructure as well as to confirm correctness of related information included in the Monitoring Report ^{/4/} and the Transition Request Form + GS4GG PDD for the GS project activity ^{/2/}.
- The possibility of performing a remote (but comprehensive) checking of all project's monitoring instruments/equipment (including confirmation of occurred performance of appropriated related calibration events in such instruments/equipment) as well as checking of monitoring practices as part of the operation of the GS project activity vis-à-vis related requirements of the registered and Transition Request Form + GS4GG PDD for the GS project activity ^{/2/} as well as the applied CDM baseline and monitoring methodology. Such checking included confirmation of existence and archiving in the project site of original documents (e.g. certificates of calibration) in the project site + additional documentation used for cross-checking of calculation and information, with electronic format copies of such documents and evidence being also made available to the Applus+ Certification's verification team for its remote assessment (as part of the performed desk review assessment phase).
- The possibility of performing a comprehensive checking of the project's quality control and quality assurance (QA/QC) procedures in place to prevent and/or identify and/or correct errors or omissions in the reported monitoring parameters.

Based on its accumulated expertise and experience with assessments for other similar project-based initiatives, and its procedures for performing remote inspections to GHG emission reduction project activities, it is Applus+ Certification's opinion that objectives to be expected for a physical on-site inspection to the project site were sufficiently reached by the Applus+ Certification's verification team through watching online (and later re-watching for further assessment/review) of the set of sequential live videos (movies) + photographs (pictures) ^{/49/}.

In summary, by taking all above-presented aspects into account vis-à-vis applicable GS requirements, the Applus+ Certification's verification team judged that performing the above-described additional checking/assessment (complementary auditing measure) instead of performing the previously scheduled physical on-site inspection to the project site is deemed acceptable and sufficient to have the overall quality and completeness of the performed verification assessment not being negatively affected.

4.3 Interviews

The following subjects were discussed with representatives of the project developer during the performed remote audit on 08/05/2024:

Interviewed Personnel	Role - Organization	Subject
Mr. Rodrigo Pedroso	Consultant- Unicarbo Energia e Biogás Ltda.	Interviews remotely performed using Google Meet application and encompassing the following: - General implementation and operational aspects of the GS project activity. - Technical equipment and operational issues for equipment/instrument under installed and operational status during the monitoring period. - Specifications and operational details of monitoring and measurement equipment/instruments under operation during the considered monitoring period. - Remaining issues from the previously performed GS validation for transitioning and verifications assessments under the CDM. - Calibration requirements and performed calibration events for monitoring instruments/equipment under installed and operational status during the considered monitoring period. - Quality management system and related compliance with valid QA/QC procedures. - Involved operational and management personnel and responsibilities. - Training and practice of the operational and management personnel. - Implementation and operation of the project's monitoring plan. - Monitoring data handling and management (incl. data gathering, recording and reporting). - Data uncertainty and residual risks. - Performance of emission reductions calculations. - Procedural aspects of the verification. - Performance of related maintenance and repair events. - Compilation of GS4GG related documentation (incl. the Monitoring Report /04/). - Compliance with relevant Safeguarding Principles. - Monitoring of SDG impacts related to the GS project activity, in accordance with the
Ms. Clarissa Martins	Orizon Valorização de Resíduos S.A.	
Ms. Mariana Miralles Prado	Orizon Valorização de Resíduos S.A.	

		Transition Request Form + GS4GG PDD /02/ for the GS project activity.
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Moreover, the Applus+ Certification's verification team has performed two additional interviews on 09/05/2024 (via Google meet application) with the following representatives of local neighborhoods (in order to obtain opinions regarding the implementation/operation of the project activity from local stakeholders):

- Mrs. Maria Odete dos Santos Pereira, resident of a neighboring community and currently employed at a local company of waste collection and transportation ("Waste Coleta de Resíduos Hospitalares Ltda.")
- Mr. Genivaldo Borges, public server and resident of a neighboring community

The interviewees 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.

4.4 Reporting of findings

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

A CAR is issued, where:

- Non-compliance with the monitoring plan or methodology is found in monitoring and reporting and has not been sufficiently documented by the project developer, or if the evidence provided to prove conformity is insufficient.
- Modifications to the implementation, operation and monitoring of the GS project activity have not been sufficiently documented by the project developer.
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions.
- Issues identified in a FAR during the validation phase and/or previous verifications to be verified during the verification have not been resolved by the project developer.

The assessment team shall raise a Clarification Request (CL) if project related information is insufficient or not clear enough to determine whether the applicable CDM/GS4GG requirements have been 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 issuance of GS VERs.

Forward Action Requests (FARs) may be raised during verification for actions where the monitoring and/or reporting require attention and/or adjustment for the next verification period.

As part of the performed verification assessment, nine (9) CARs were raised by the Applus+ Certification's verification Team. No CLs and no FARs were raised as part of the performed

verification assessment. The description of the raised findings, the responses of the project proponent and the assessment of such responses by the Applus+ Certification's verification team are presented in Appendix 1.

4.5 Internal Quality Control

As part of Applus+ Certification internal quality control system, after the completion of the assessment by the appointed verification team (including completion of the final draft Verification Report (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 Verification Report. The technical review team assesses whether all the reporting requirements have been fulfilled in both the Monitoring Report ^{/04/} and draft version of the Verification Report 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 Verification Report completed by the appointed verification 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 Verification Report. The final Verification Report (after resolutions of all findings) is then submitted to the head of operations of Applus+ for final review and approval.

5. VERIFICATION FINDINGS

5.1 Participation under other GHG programs

While the GS project activity was previously registered under the CDM, it has issued CERs under the CDM up to 31/12/2020⁷. Thus, the GS project activity is only 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 GS project activity is not accredited / registered under I-REC Brazil program (<https://site.institutototum.com.br/>). The Applus+ Certification's verification team also checked publicly information and registration details valid for the REC/VER registries/programs below and also confirmed that the 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.terra.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

⁷As confirmed by the Applus+ Certification's verification team through assessment of the project's webpage under the CDM, available online:
<https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=2>

The Applus+ Certification's verification team was also able to confirm that the GHG emission reductions generated and/or yet to be generated by the GS project activity (including GHG emission reductions generated during the considered monitoring period) 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. This was also confirmed by the Applus+ Certification's verification team through assessment of a declaration signed by the project developers, which is enclosed to the Monitoring Report ^{/04/}.

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 GS project activity would be eligible under.

5.2 Compliance of the Monitoring Report with the monitoring report template

The Applus+ Certification's verification team has assessed whether the valid version of the GS4GG Monitoring Report Form/Template (version 1.1) ^{/31/} was applied and correctly completed for the elaboration of the Monitoring Report for the considered monitoring period. The assessment included checking whether the form/template was not changed in its content and formatting.

As a conclusion of its assessment, the Applus+ Certification's verification team confirmed that the Monitoring Report was correctly completed by applying the valid version of the GS4GG Monitoring Report Form/Template ^{/31/} and by also sufficiently taking into consideration all applicable requirements and guidance for its completion, including deemed complete and correct description of the GS project activity and its monitoring aspects.

5.3 FARs from Validation and/or Previous Verification

The Validation Report of the Transitioning of the GS project activity from the CDM to the GS4GG includes the following FARs:

FAR 1:

"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."

As presented in the Appendix 1, this FAR was sufficiently addressed by the project developer by including a Declaration in the Monitoring Report which confirms that the project will not issue both CERs/other compliance units under the Paris Agreement and a GSVER for the same vintage (for the considered and also for future monitoring periods within the GS4GG).

FAR 2:

"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".

Although the start date of the crediting period for the project activity under the GS4GG was defined as 01/01/2021, the decision to transition the project activity from the CDM to the GS4GG was only made during the year of 2022, and the agreement with Applus+ Certification to perform the joint Validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1st monitoring period of the project activity under the GS4GG) was only made on 14/04/2023. Nonetheless, a site visit was recently performed by the Applus+ Certification's team which was designated to perform the joint validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1st monitoring period of the project activity under the GS4GG) on 18/05/2023. The quoted requirements are thus considered as sufficiently met, with no site visit being required in the context of the considered monitoring period.

FAR 3:

"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 completed². 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".

As confirmed by Applus+ Certification's verification team, the GS4GG project activity was only registered under the GS4GG on 12/03/2024 (date of Design Review approval). Thus, an initial Annual Report for the GS project activity (valid for the year of 2023) ^{/53/} (which was assessed by the Applus+ Certification's verification team) will be submitted along with the Monitoring Report ^{/04/}.

Moreover, while the first Performance Review was performed by Applus+ Certification jointly with the Validation assessment (for the transition from the CDM to the GS4GG), the related quoted requirement is thus also considered as sufficiently met

5.4 Compliance of the project implementation and operation with the Transition Request Form + GS4GG PDD for the GS project activity

The Applus+ Certification's verification team assessed whether the GS project activity was fully implemented according to the description presented in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity by the end of the considered monitoring period. It is relevant to note that the present verification assessment encompasses the last monitoring period for the project activity under the GS4GG (as confirmed by the Applus+ Certification's verification team and appropriately indicated in both the Transition Request Form + GS4GG PDD ^{/02/} and Section A.4 of the Monitoring Report, the crediting period of the project activity under the GS4GG encompassed the period from 01/01/2021 to 26/11/2023).

As also confirmed by the Applus+ Certification's verification team, the project activity was implemented and has been operated (by the project developer Orizon Valorização de Resíduos S.A.) within the area of the Ecoparque João Pessoa landfill, which is located in the city of João Pessoa, Paraíba State, at the following geographical coordinates:

- Latitude: 7° 13' 4" S (-7.134)
- Longitude: 34° 57' 23" W (-34.5723)

As a result of performed document desk review and remote audit, the verification team was able to confirm that all physical features of the GS project activity (including, technology, project equipment and monitoring & metering equipment) were in place as described in both the Transition Request Form + GS4GG PDD ^{/02/} and the Monitoring Report ^{/04/}.

The Applus+ Certification verification team assessed the table included in Section B.1 of the Monitoring Report which includes all major milestones for the project activity and confirmed the correctness of information included in such table (through assessment of project documentation available at the UNFCCC webpage⁸ and previous documentation for the project activity under the GS4GG).

The Applus+ Certification verification team has confirmed that the project's infrastructure so far encompassed by the GS project activity includes the following currently installed main equipment during the considered monitoring period:

- Active LFG collection system encompassing set of LFG collection wells installed across the landfill site, which are interconnected through a high-density polyethylene (HDPE) LFG collection pipeline network. This pipeline includes condensation pots (where part of the humidity in collected LFG is physically removed/drained through condensation).
- Centrifugal blower system used to direct collected LFG to the flare and to the engine-generator sets.
- 1 high temperature enclosed flare for which main specifications, as appropriately outlined in Section A.3 of the Transition Request Form + GS4GG PDD (version 3.2) ^{/02/}, are summarized as follows:

⁸ <https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=1>

LFG combustion flaring equipment	Characteristics/specifications ⁹
Flare 1	Manufacturer: Biotecnogás s.r.l. Model: BTG167-07-C 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 Min. temperature of the exhaust gas to ensure high CH ₄ destruction efficiency: 850 °C Max. temperature of the exhaust gas to ensure high CH ₄ destruction efficiency: 1,200 °C

Source: ^{/51/}

- Set of 4 engine-generator sets manufactured by GE Jenbacher & Co OHG, model J420, 4 series with about 1.426 MW of nameplate installed capacity (uniquely fueled by LFG) with total combined nameplate installed capacity of 5.70 MW ^{/50/}.

Moreover, during the performed interviews, the Applus+ Certification's verification team was informed in further details about the overall operational performance of the GS project activity since its starting of operations (with detailed assessment being performed regarding the GS project activity's operational performance during the considered monitoring period).

As confirmed by the Applus+ Certification's verification team, the GS project activity was temporarily out of operation during different short time periods along the considered monitoring period due to different operational reasons (e.g. scheduled equipment maintenance, performance of calibration events in monitoring instruments/equipment, draining of accumulated condensate in LFG pipeline, etc.).

The Applus+ Certification's verification team has also confirmed that Sustainable Development Contributions and Product Vintages achieved by the GS project activity during the considered monitoring period are correctly summarized in Tables 1 and 2 of the Monitoring Report, respectively.

5.5 Post-Design Certification changes

5.4.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

The Applus+ Certification's verification team has confirmed that, as correctly outlined in Section B.2.1 of the Monitoring Report ^{/04/}, there is no temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline applicable for the GS project activity.

5.4.2. Corrections

The Applus+ Certification's verification team has confirmed that, as correctly outlined in Section B.2.2 of the Monitoring Report ^{/04/}, there are no Corrections applicable for the GS project activity.

⁹Details for the installed flares were confirmed by the Applus+ Certification's verification team through assessment of specification sheets/declaration from the manufacturers of the flares.

5.4.3. Changes to start date of crediting period

The Applus+ Certification's verification team has confirmed that, as correctly outlined in Section B.2.3 of the Monitoring Report ^{/04/}, there are no changes to the start date of crediting period applicable for the GS project activity.

5.4.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

The Applus+ Certification's verification team has confirmed that, as correctly outlined in Section B.2.4 of the Monitoring Report ^{/04/}, there are no Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline applicable for the GS project activity.

5.4.5. Changes to project design of approved project

The following Changes to project design of approved project were correctly and successfully addressed through completion of a revised version of the CDM-PDD for the 2nd CDM crediting period from 27/11/2015 to 26/11/2022 (version 8, dated 24/05/2019) ^{/27/}:

- *LFG collection efficiency was corrected to 80%, according to technical letter from LFG plant operator based on its expertise, due to specific characteristics of project site and its collection system. The change does not affect the design of the PA and it is not caused by the PP. The information was not known when the project had the renewal of its crediting period validated.*

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For the currently expired 2nd CDM 7-year crediting period of the CDM project activity, as confirmed by the Applus+ verification team, a previously revised version of the CDM-PDD valid for such expired crediting period was approved on 16/07/2019 (under the PRC reference number PRC-1165-002) addressing Changes to project design of approved project.

Applus+ has confirmed that the GS Monitoring Report correctly refers to Changes to project design of approved project that are applicable/valid for previous monitoring periods within the project's 2nd CDM 7-year crediting period (including appropriate indication of PRC reference and related approval date).

The Applus+ verification team has also confirmed that, as correctly outlined in Section B.2.5. of the GS Monitoring Report ^{/04/}, the verification assessment for the considered monitoring period of the project activity includes post-registration changes under the category "Changes to project design of approved project".

Finally, the Applus+ Certification's verification team has confirmed there are no Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline applicable for the GS project activity for the considered monitoring period.

5.6 Compliance of the monitoring plan with applied CDM baseline and monitoring methodology, applied CDM methodological tools and other applied methodological or regulatory requirements

As part of the performed document review and remote inspection, the Applus+ Certification's verification team has reviewed the application of the implemented monitoring plan along the considered monitoring period vis-à-vis the monitoring requirements of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity. The application of the monitoring plan during the considered monitoring period was also verified against all applicable requirements of the CDM monitoring methodology ACM0001 (Version 19.0) ^{/06/} and applied CDM methodological tools ^{/10/} ^{/11/} ^{/12/} ^{/14/} ^{/15/} in order to confirm its compliance.

Based on the performed document desk review + remote inspection, the verification team confirmed that the monitoring plan was applied and operationalized during the considered period under full conformance with the provisions of the Transition Request Form + GS4GG PDD for the GS project activity for the project's infrastructure under operation during the considered monitoring period. Moreover, as also confirmed by the Applus+ Certification's verification team, the applied monitoring plan also sufficiently meets all applicable requirements of the CDM baseline and monitoring methodology ACM0001 (version 19.0) and applicable methodological tools.

As confirmed by the Applus+ Certification's verification team and in line with the project design description presented in the Transition Request Form + GS4GG PDD ^{/02/}, so far, there are still no legal restrictions or requirements/obligations for LFG collection and destruction in Brazil. Moreover, there are still no legal restrictions or requirements/obligations for utilizing collected LFG as gaseous fuel for generation of electricity in Brazil either.

5.7 Compliance of monitoring activities with the monitoring plan as per the Transition Request Form + GS4GG PDD for the GS project activity

5.7.1. Data and parameters fixed ex ante

The Applus+ Certification's verification team assessed the Monitoring Report ^{/04/} and emission reduction calculation spreadsheet ^{/05/} in order to confirm whether all ex-ante determined (fixed) parameters (that are applicable for the calculations of achieved emission reductions by the GS project activity) were correctly reported in the latest version of the Monitoring Report ^{/04/} and correctly applied/considered (as per the provisions of the Transition Request Form + GS4GG PDD ^{/02/}) in related emission reduction calculations valid for the considered monitoring period.

The following ex-ante determined parameters were correctly applied/considered in the context of emission reduction calculations for the considered monitoring period:

Ex-ante determined parameter	Applicable SDG	Value
Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline (OX_{top_layer})	SDG 13	0.1
Global Warming Potential of CH_4 (GWP_{CH_4})	SDG 13	28 tCO_2e/tCH_4
Universal ideal gas constant (R_u)	SDG 13	8,314 $Pa \cdot m^3/kmol \cdot K$
Molecular mass of greenhouse gas / (MM_i)	SDG 13	16.04 $kg/kmol$ (for CH_4)
Total pressure at normal conditions (P_n)	SDG 13	101,325 Pa
Temperature at normal conditions (T_n)	SDG 13	273.15 K
Manufacturer's flare specifications for temperature, flow rate and maintenance schedule ($SPEC_{flare}$)	SDG 13	Flare model 2500 HT
		Minimum flare temperature 850 °C
		Maximum flare temperature 1,200 °C
		Minimum and maximum inlet flow rate Minimum flow: 500 Nm^3/h Maximum flow: 2,500 Nm^3/h
		Maximum duration in days between maintenance events Min. every 6 months
CO_2 emission factor for grid-sourced electricity in year y ($EF_{EL,grid,y}$)	SDG 13	0.25 tCO_2/MWh (for electricity exported by the project activity through the electricity grid) 1.3 tCO_2/MWh (for consumption of grid-sourced electricity by the project activity)
Weighting of build margin emissions factor (w_{BM})	SDG 13	0.75
Weighting of operating margin emissions factor (w_{OM})	SDG 13	0.25
Build margin emission factor of the Brazilian grid ($EF_{grid,BM,y}$) ¹⁰	SDG 13	0.0028 tCO_2/MWh

¹⁰ Available online:
<https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao>.

Ex-ante determined parameters not used in the context of ex-post calculation of emission reductions achieved by the GS project activity during the considered monitoring period:

The Applus+ Certification's verification team has also confirmed that the following ex-ante determined parameters (which are also included/listed in the Transition Request Form + GS4GG PDD ^{/02/}) were not considered/used for the purpose of ex-post determination of baseline emissions and/or project emissions achieved by the GS project activity during the considered monitoring period:

- Efficiency of the LFG capture system that will be installed in the project activity (η_{PJ})
- Molecular mass of gas k (MM_k)
- Molecular mass of water (MM_{H_2O})
- Model correction factor to account for model uncertainties ($\phi_{default}$)
- Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (OX)
- Fraction of methane in the SWDS gas (volume fraction) (F)
- Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS ($DOC_{f,default}$)
- Methane Correction factor ($MCF_{default}$)
- Fraction of degradable organic carbon (by weight) in the waste type j (DOC_j)
- Decay rate for the waste type j (k_j)
- Weight fraction of the waste type j (W_j)
- CO₂ emission factor for electricity sourced by the captive off-grid electricity generators ($EF_{EL,captive,y}$)

The above-listed parameters are confirmed by the Applus+ Certification's verification team as being only used in the context of ex-ante estimation of emission reductions to be achieved by the GS project activity as reported and further explained in its Transition Request Form + GS4GG PDD ^{/02/}.

5.7.2. Data and parameters monitored ex-post

The Applus+ Certification's verification team has assessed whether all monitoring parameters of which monitoring ex-post is required as per the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity (and by taking into account the project infrastructure so far implemented and under continuous operation by the end of the considered monitoring period) were correctly monitored during the period.

The following tables include assessment details for parameters monitored ex-post during the monitoring period from 01/03/2023 to 26/11/2023:

SDG 13

Data / Parameter: (as per the monitoring plan of the PDD):	Management of SWDS (Management of SWDS)
Measuring, recording and reporting frequencies:	The ex-post determination of the monitoring parameter "Management of the SWDS" is not based on measurements. As correctly outlined in the Monitoring Report ^{/04/}, management aspects of the Ecoparque João Pessoa Landfill are compared against previously defined landfill management practices (as per the also previously conceived original construction and operational design of this particular landfill). This comparison aims to confirm that management and operation of the Ecoparque João Pessoa Landfill (including relevant aspects related to landfilling practice) were not intentionally modified with the unique aim of increasing generation of methane on site and thus artificially increasing baseline emissions for the project activity. As per the monitoring plan from the Transition Request Form + GS4GG PDD ^{/02/}, monitoring for the parameter "Management of the SWDS" is confirmed as being performed on the basis of a technical evaluation assessment ^{/18/} of the overall management and operation of the Ecoparque João Pessoa Landfill with at least every year frequency. The evaluation assessments performed by the independent 3rd party engineering company "Alta Geotecnia Ambiental Ltda." in 18/04/2022, 07/03/2023 and 05/03/2024 ^{/18/} as the applicable monitoring procedure for the parameter Management of the SWDS valid for the considered monitoring period are of deemed reasonable and acceptable frequency. That sufficiently confirms that the applied monitoring frequency is in accordance with both the monitoring plan from the Transition Request Form + GS4GG PDD ^{/02/} and ACM0001 (version 19.0) ^{/06/}. While the Transition Request Form + GS4GG PDD ^{/02/} establishes monitoring frequency for the parameter "Management of the SWDS" of every one-year (12 months), evaluation assessments valid for considered monitoring period were performed under a higher frequency. By taking into account the required monitoring frequency as per the monitoring plan from the Transition Request

	Form + GS4GG PDD ^{/02/} , the performed technical assessments which are referred to in the Monitoring Report ^{/04/} are thus correctly assumed as being valid for the whole considered monitoring period.
Type of monitoring equipment/instrument:	Not applicable
Calibration frequency	Not applicable
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The Applus+ verification team was able to verify that related information included in the Monitoring Report is fully in accordance with the content of the evaluation/declaration reports issued by Alta Geotecnia Ambiental Ltda. ^{/18/} in 18/04/2022, 07/03/2023 and 05/03/2024. These technical reports were made available and were assessed by the Applus+ verification team.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed at the end of this Section. In the particular case of the monitoring parameter "Management of the SWDS", there are no monitoring records (figures) to be considered/accounted in the context of emission reduction calculations for the considered monitoring period. However, the annual comparison of applied management aspects of the Ecoparque João Pessoa Landfill against the defined landfill management practices as per the previously conceived original construction and operational design of the landfill (in order to confirm that management and operation of the Ecoparque João Pessoa Landfill were not intentionally modified with the unique aim of increasing generation of methane on site) is a monitoring requisite. As required by ACM0001 (version 19.0) ^{/06/}, any change in the management of the landfill after the implementation of the project activity is to be justified by referring to technical or regulatory specifications and related impacts of such eventual changes should be addressed in the determination of baseline emissions. In summary, monitoring information for the parameter "Management of the SWDS" is used for the determination/confirmation of baseline emissions and/or confirmation of the project's implementation as per project design descriptions included in the Transition Request Form + GS4GG PDD ^{/02/} (in terms of operation and management conditions of the landfill from which LFG is combusted).

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$)																														
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuous measurements of the monitoring parameter $V_{t,wb}$ were recorded and reported with every minute frequency. As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, measurements of $V_{t,wb}$ are to be continuously performed by the use of appropriate LFG flow meters. Moreover, ACM0001 (Version 19.0) ^{/06/} does not specify any monitoring frequency for $V_{t,wb}$. The applied measuring, recording and reporting frequencies are thus in accordance with both ACM0001 (Version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity. <u>The Applus+ Certification's verification team confirmed that the following monthly average values for $V_{t,wb}$ (based on the sub-parameters $V_{t,wb,flare}$ and $V_{t,wb,engines}$) are correctly reported in the Monitoring Report:</u> <table><tr><th>Month</th><th>Average value of $V_{t,wb,flare}$ (Nm³/h)</th><th>Average value of $V_{t,wb,engines}$ (Nm³/h)</th></tr><tr><td>March/2023</td><td>1,527</td><td>2,555</td></tr><tr><td>April/2023</td><td>1,627</td><td>2,281</td></tr><tr><td>May/2023</td><td>1,943</td><td>2,565</td></tr><tr><td>June/2023</td><td>1,764</td><td>2,633</td></tr><tr><td>July/2023</td><td>1,631</td><td>2,754</td></tr><tr><td>August/2023</td><td>1,410</td><td>2,751</td></tr><tr><td>September/2023</td><td>1,311</td><td>2,732</td></tr><tr><td>October/2023</td><td>1,281</td><td>2,545</td></tr><tr><td>November/2023</td><td>749</td><td>2,552</td></tr></table>	Month	Average value of $V_{t,wb,flare}$ (Nm ³ /h)	Average value of $V_{t,wb,engines}$ (Nm ³ /h)	March/2023	1,527	2,555	April/2023	1,627	2,281	May/2023	1,943	2,565	June/2023	1,764	2,633	July/2023	1,631	2,754	August/2023	1,410	2,751	September/2023	1,311	2,732	October/2023	1,281	2,545	November/2023	749	2,552
Month	Average value of $V_{t,wb,flare}$ (Nm ³ /h)	Average value of $V_{t,wb,engines}$ (Nm ³ /h)																													
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October/2023	1,281	2,545																													
November/2023	749	2,552																													
Type of monitoring equipment/instrument:	Continuously measurements of LFG flow sent to the flare were confirmed as being performed by two LFG flow meters used alternately during the considered monitoring period (due to calibration schedules). Their main specification details are summarized below: <table><tr><th colspan="2">Specifications of the utilized LFG Flow meter (volumetric flow to the flare) in operation from 01/03/2023 to 16/03/2023</th></tr><tr><td>Serial number</td><td>662115</td></tr><tr><td>Accuracy</td><td>±2.0%</td></tr><tr><td>Model</td><td>ST51-1F11C0003</td></tr><tr><td>Manufacturer</td><td>FCI Fluid Components International</td></tr></table> Source: ^{/33/} <table><tr><th colspan="2">Specifications of the utilized LFG Flow meter (volumetric flow to the flare) in operation from 16/03/2023 to 26/11/2023</th></tr></table>	Specifications of the utilized LFG Flow meter (volumetric flow to the flare) in operation from 01/03/2023 to 16/03/2023		Serial number	662115	Accuracy	±2.0%	Model	ST51-1F11C0003	Manufacturer	FCI Fluid Components International	Specifications of the utilized LFG Flow meter (volumetric flow to the flare) in operation from 16/03/2023 to 26/11/2023																			
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	<table><tr><td>Serial number</td><td>440371</td></tr><tr><td>Accuracy</td><td>±2.0%</td></tr><tr><td>Model</td><td>ST51- EJ33CR0B</td></tr><tr><td>Manufacturer</td><td>FCI Fluid Components International</td></tr></table>	Serial number	440371	Accuracy	±2.0%	Model	ST51- EJ33CR0B	Manufacturer	FCI Fluid Components International		
	Serial number	440371									
	Accuracy	±2.0%									
	Model	ST51- EJ33CR0B									
	Manufacturer	FCI Fluid Components International									
	Source: /33/										
	Continuously measurements of LFG flow sent to the engine-generator sets were confirmed as being performed by a LFG flow meter during the considered monitoring period. Its main specification details are summarized below:										
	<table><tr><td colspan="2">Specifications of the utilized LFG Flow meter (volumetric flow to the engine generator sets) in operation during the whole considered monitoring period</td></tr><tr><td>Serial number</td><td>691387</td></tr><tr><td>Accuracy</td><td>±2.0%</td></tr><tr><td>Model</td><td>ST51-1F11FA003</td></tr><tr><td>Manufacturer</td><td>FCI Fluid Components International</td></tr></table>	Specifications of the utilized LFG Flow meter (volumetric flow to the engine generator sets) in operation during the whole considered monitoring period		Serial number	691387	Accuracy	±2.0%	Model	ST51-1F11FA003	Manufacturer	FCI Fluid Components International
	Specifications of the utilized LFG Flow meter (volumetric flow to the engine generator sets) in operation during the whole considered monitoring period										
	Serial number	691387									
Accuracy	±2.0%										
Model	ST51-1F11FA003										
Manufacturer	FCI Fluid Components International										
Source: /34/											
The Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/ do not specify any accuracy requirement for the LFG flow meters installed at the project site. Based on its sectoral expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is the opinion of the Applus+ Certification verification team that the use of the installed instruments represents good practice for monitoring of total amount of LFG captured.											
Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed LFG Flow meters are to be calibrated every 2 years. As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed LFG Flow meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer.										
	Calibration events valid for LFG Flow meter (S/N 662115):										
	<table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>07/10/2021</td><td>FMC4890/1021</td><td>Flowmeter Calibração e Manutenção Ltda.</td><td>06/10/2023</td></tr></table>	Calibration date	Certificate number	Company performing the calibration event	Validity	07/10/2021	FMC4890/1021	Flowmeter Calibração e Manutenção Ltda.	06/10/2023		
Calibration date	Certificate number	Company performing the calibration event	Validity								
07/10/2021	FMC4890/1021	Flowmeter Calibração e Manutenção Ltda.	06/10/2023								
Source: /19/											
Calibration events valid for LFG Flow meter (S/N 440371):											

	Calibration date	Certificate number	Company performing the calibration event	Validity
	25/03/2022	LMH 3210/2022_R1	Hirsa Sistemas de Automação e Controle Ltda.	24/03/2024
Source: /19/				
Calibration events valid for LFG Flow meter (S/N 691387):				
	Calibration date	Certificate number	Company performing the calibration event	Validity
	25/08/2022	LMH 9640/2022	Hirsa Sistemas de Automação e Controle Ltda.	24/08/2024
Source: /19/				
Calibration Certificates for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.				
As per both the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/, the installed LFG flow meters are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (2 years, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/.				
As also confirmed by Applus+ Certification's verification team the performed calibration events for the LFG flow meters confirmed proper functioning of the measurement instruments.				
Moreover, as outlined in the Monitoring Report /04/, there are no relative delays in performing the calibration events for the installed LFG Flow meters.				
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified, compared and/or cross-checked?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period:			

	- Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m (Flame_m) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet /05/ includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.

Data / Parameter: (as per the monitoring plan of the PDD):	Volumetric fraction of CH_4 in the collected LFG in interval t on a wet basis ($V_{CH_4,t,wb}$)
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Measuring, recording and reporting frequencies:

During the considered monitoring period, continuous measurements of the monitoring parameter $V_{CH_4,t,wb}$ were recorded and reported with every minute frequency.

As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, measurements of $V_{CH_4,t,wb}$ are to be performed continuously. Moreover, ACM0001 (Version 19.0) ^{/06/} does not specify any monitoring frequency for $V_{CH_4,t,wb}$, the applied measuring, recording and reporting frequencies are thus in accordance with both ACM0001 (Version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.

The Applus+ Certification's verification team confirmed that the following monthly average values for $V_{CH_4,t,wb}$ are correctly reported in the Monitoring Report:

Month	Average value of $V_{CH_4,t,wb}$ (%)
March/2023	52.69
April/2023	51.72
May/2023	50.35
June/2023	48.76
July/2023	50.20
August/2023	48.64
September/2023	47.18
October/2023	46.19
November/2023	43.82

Tabla con formato

Type of monitoring equipment/instrument:

Continuous measurements of $V_{CH_4,t,wb}$ were confirmed as being performed by an installed continuous CH_4/O_2 fraction gas analyzer unit of which main specifications details are summarized below:

Specifications of the utilized continuous CH_4/O_2 fraction gas analyzer unit in operation from 01/03/2023 to 26/11/2023

Serial number	N1-M6-684
Accuracy	±2.0%
Model	Ultramat 23
Manufacturer	Siemens

Source: ^{/35/}

The Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/} do not specify any accuracy requirement for the installed continuous CH_4/O_2 fraction gas analyzer unit at the project site. The accuracy range for the installed instrument is ±2.0%. Based on its sectoral expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is the opinion of the Applus+ Certification's verification team that the use of the Installed instrument represents good practice for monitoring of methane fraction in the LFG.

Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed continuous CH ₄ /O ₂ fraction gas analyzer unit is to be calibrated every 12 months (1 year). As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed gas analyzer unit, the selected calibration frequency is as per the recommendations of the instrument manufacturer.												
	Calibration events valid for the installed CH ₄ /O ₂ fraction gas analyzer unit:												
	<table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>23/08/2022</td><td>2358-01/22</td><td>Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.</td><td>22/08/2023</td></tr><tr><td>23/08/2023</td><td>2481/23</td><td>Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.</td><td>22/08/2024</td></tr></table>	Calibration date	Certificate number	Company performing the calibration event	Validity	23/08/2022	2358-01/22	Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.	22/08/2023	23/08/2023	2481/23	Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.	22/08/2024
	Calibration date	Certificate number	Company performing the calibration event	Validity									
	23/08/2022	2358-01/22	Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.	22/08/2023									
	23/08/2023	2481/23	Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda.	22/08/2024									
	Source: /20/												
	Calibration Certificate for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.												
	As per both the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/, the installed continuous CH ₄ /O ₂ fraction gas analyzer unit is to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations.												
	As also confirmed by Applus+ Certification's verification team the performed calibration events for the continuous CH ₄ /O ₂ fraction gas analyzer units confirmed proper functioning of the measurement instruments.												
As outlined in the Monitoring Report /04/, a relative delay in the performance of calibration events for the gas analyzer unit with Serial Number N1-M6-684. In order to address such delay, a conservative correction factor was systematically applied in all related measurement records for the monitoring parameter V _{CH₄,t,wb} as follows:													

	Parameter	Correction factor applied	Period when the correction factor is applied
	$V_{CH_4,t,wb}$	-2.0%	From 22/08/2023 to 23/08/2023 (first identified calibration date) (1 day)
	The $\pm 2.0\%$ represents the assumed maximum permissible error of the measurement instrument, which is higher than the measurement deviation error which was obtained as a result of the performed delayed calibration event in the instrument.		
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m ($Flame_m$) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet /05/ includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.		

Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.
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Data / Parameter: (as per the monitoring plan of the PDD¹¹):	Temperature of the LFG stream in time interval $t(T_t)$										
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuous measurements of the monitoring parameter T_t were recorded and reported with every minute frequency. As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, measurements of T_t are to be continuously performed by the use of appropriate temperature meters. Moreover, ACM0001 (Version 19.0) ^{/06/} does not specify any monitoring frequency for T_t. The applied measuring, recording and reporting frequencies are thus in accordance with both ACM0001 (Version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.										
Type of monitoring equipment/instrument:	Continuously measurements of temperature of collected LFG were confirmed as being performed by three temperature sensors used alternately during the considered monitoring period (due to calibration schedules). Their main specification details are summarized below: <table border="1" data-bbox="459 1529 1046 1682"> <thead> <tr> <th colspan="2">Specifications of the utilized temperature meter in operation from 01/03/2023 to 15/06/2023</th></tr> </thead> <tbody> <tr> <td>Serial number</td><td>N2041.750002</td></tr> <tr> <td>Accuracy</td><td>Max of $\pm 0.1K$ or $\pm 0.1\%$ of span</td></tr> <tr> <td>Model</td><td>IPAQ-C202</td></tr> <tr> <td>Manufacturer</td><td>Inor Process AB</td></tr> </tbody> </table> Source: ^{/37/}	Specifications of the utilized temperature meter in operation from 01/03/2023 to 15/06/2023		Serial number	N2041.750002	Accuracy	Max of $\pm 0.1K$ or $\pm 0.1\%$ of span	Model	IPAQ-C202	Manufacturer	Inor Process AB
Specifications of the utilized temperature meter in operation from 01/03/2023 to 15/06/2023											
Serial number	N2041.750002										
Accuracy	Max of $\pm 0.1K$ or $\pm 0.1\%$ of span										
Model	IPAQ-C202										
Manufacturer	Inor Process AB										

¹¹ In the particular context of the GS verification assessment for which this Verification Report is valid to, the term "the PDD" refers to the Transition Request Form + GS4GG PDD for the GS project activity.

	Specifications of the utilized temperature meter in operation from 15/06/2023 to 01/10/2023															
	Serial number		N2020.745989													
	Accuracy		Max of ±0.1K or ±0.1% of span													
	Model		PT-100													
	Manufacturer		Ecil Produtos e Sistemas de Medição e Controle de Temperatura													
	Source: ^{/37/}															
	Specifications of the utilized temperature meter in operation from 01/10/2023 to 26/11/2023															
	Serial number		N2044.222597													
	Accuracy		Max of ±0.1K or ±0.1% of span													
	Model		PT-100													
Manufacturer		Ecil Produtos e Sistemas de Medição e Controle de Temperatura														
Source: ^{/37/}																
The Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/} do not specify any accuracy requirement for the temperature meters installed at the project site. Based on its sectoral expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is the opinion of the Applus+ Certification verification team that the use of the installed instruments represents good practice for monitoring of the temperature of the gaseous stream.																
Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed temperature meters are to be calibrated yearly. As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed temperature meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer. Calibration events valid for temperature meter (S/N N2041.750002): <table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>26/08/2022</td><td>0455/2022</td><td>TQS Metrologia</td><td>25/08/2023</td></tr></table> Source: ^{/21/} Calibration events valid for temperature meter (S/N N2020.745989): <table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the</th><th>Validity</th></tr></table>				Calibration date	Certificate number	Company performing the calibration event	Validity	26/08/2022	0455/2022	TQS Metrologia	25/08/2023	Calibration date	Certificate number	Company performing the	Validity
Calibration date	Certificate number	Company performing the calibration event	Validity													
26/08/2022	0455/2022	TQS Metrologia	25/08/2023													
Calibration date	Certificate number	Company performing the	Validity													

			calibration event	
	28/10/2022	0979/2022	TQS Metrologia	27/10/2023
Source: /21/				
Calibration events valid for temperature meter (S/N N 2044.222597):				
	Calibration date	Certificate number	Company performing the calibration event	Validity
	08/09/2023	0557/2023	TQS Metrologia	07/09/2024
Source: /21/				
Calibration Certificates for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.				
As per both the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/, the installed temperature meters are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (yearly, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/.				
As also confirmed by Applus+ Certification's verification team the performed calibration events for the temperature meters confirmed proper functioning of the measurement instruments.				
Moreover, as outlined in the Monitoring Report /04/, there are no relative delays in performing the calibration events for the installed temperature meters.				
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified, compared and/or cross-checked?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$)			

	- Volumetric fraction of CH₄ in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m ($Flame_m$) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet /05/ includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.

Data / Parameter: (as per the monitoring plan of the PDD):	Pressure of the LFG stream in time interval t (P_t)																				
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuous measurements of the monitoring parameter P_t were recorded and reported with every minute frequency. As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, measurements of P_t are to be continuously performed by the use of appropriate pressure meters. Moreover, ACM0001 (Version 19.0) ^{/06/} does not specify any monitoring frequency for P_t. The applied measuring, recording and reporting frequencies are thus in accordance with both ACM0001 (Version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.																				
Type of monitoring equipment/instrument:	Continuously measurements of pressure of collected LFG were confirmed as being performed by two pressure sensors used alternately during the considered monitoring period (due to calibration schedules). Their main specification details are summarized below: <table border="1" data-bbox="459 1070 1050 1227"> <thead> <tr> <th colspan="2">Specifications of the utilized pressure meter in operation from 01/03/2023 to 20/02/2023</th></tr> </thead> <tbody> <tr> <td>Serial number</td><td>C4000005749787</td></tr> <tr> <td>Accuracy</td><td>$\pm 0.065\%$</td></tr> <tr> <td>Model</td><td>ST700</td></tr> <tr> <td>Manufacturer</td><td>Honeywell Building Technologies</td></tr> </tbody> </table> Source: ^{/38/} <table border="1" data-bbox="459 1272 1050 1429"> <thead> <tr> <th colspan="2">Specifications of the utilized pressure meter in operation from 20/02/2023 to 26/11/2023</th></tr> </thead> <tbody> <tr> <td>Serial number</td><td>C4000005594893</td></tr> <tr> <td>Accuracy</td><td>$\pm 0.065\%$</td></tr> <tr> <td>Model</td><td>ST700</td></tr> <tr> <td>Manufacturer</td><td>Honeywell Building Technologies</td></tr> </tbody> </table> Source: ^{/38/} The Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/} do not specify any accuracy requirement for the pressure meters installed at the project site. Based on its sectoral expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is the opinion of the Applus+ Certification verification team that the use of the installed instruments represents good practice for monitoring of the pressure of the gaseous stream.	Specifications of the utilized pressure meter in operation from 01/03/2023 to 20/02/2023		Serial number	C4000005749787	Accuracy	$\pm 0.065\%$	Model	ST700	Manufacturer	Honeywell Building Technologies	Specifications of the utilized pressure meter in operation from 20/02/2023 to 26/11/2023		Serial number	C4000005594893	Accuracy	$\pm 0.065\%$	Model	ST700	Manufacturer	Honeywell Building Technologies
Specifications of the utilized pressure meter in operation from 01/03/2023 to 20/02/2023																					
Serial number	C4000005749787																				
Accuracy	$\pm 0.065\%$																				
Model	ST700																				
Manufacturer	Honeywell Building Technologies																				
Specifications of the utilized pressure meter in operation from 20/02/2023 to 26/11/2023																					
Serial number	C4000005594893																				
Accuracy	$\pm 0.065\%$																				
Model	ST700																				
Manufacturer	Honeywell Building Technologies																				
Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed temperature meters are to be calibrated yearly. As confirmed by the Applus+ Certification's																				

verification team through assessment of the specification sheet for the installed pressure meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer.

Calibration events valid for pressure meter (S/N C4000005749787):

Calibration date	Certificate number	Company performing the calibration event	Validity
26/08/2022	0433/2022	TQS Metrologia	25/08/2023

Source: /23/

Calibration events valid for pressure meter (S/N C4000005594893):

Calibration date	Certificate number	Company performing the calibration event	Validity
17/02/2023	0080/2023	TQS Metrologia	16/02/2024

Source: /23/

Calibration Certificates for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.

As per both the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/, the installed pressure meters are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (yearly, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/.

As also confirmed by Applus+ Certification's verification team the performed calibration events for the pressure meters confirmed proper functioning of the measurement instruments.

Moreover, as outlined in the Monitoring Report /04/, there are no relative delays in performing the calibration events for the installed pressure meters.

How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation

Assessment details about recording of values measured at the project site are included in Section 5.6.3.

Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG

spreadsheet) verified and/or compared?	flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m ($Flame_m$) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet ^{/05/} includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of grid electricity consumed by the project activity during the year y ($EC_{PJ,grid,y}$)										
Measuring, recording and reporting frequencies:	During the considered monitoring period, accumulated values of continuous measurements of $EC_{PJ,grid,y}$ were aggregated and recorded/reported monthly by the monitoring staff of the GS project activity. As per the as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, the parameter $EC_{PJ,grid,y}$ is to be monitored continuously. ACM0001 (Version 19.0) ^{/06/} and the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} do not clearly indicate recording and reporting frequencies for continuous measurements for the parameter $EC_{PJ,grid,y}$. Thus, the adopted measuring, recording and reporting frequency for $EC_{PJ,grid,y}$ is assumed as in accordance with the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, the Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion and ACM0001 (Version 19.0) ^{/06/}.										
Type of monitoring equipment/instrument:	Continuous measurements of grid electricity consumed by the project activity were confirmed as being performed by two electricity meters used alternately during the considered monitoring period. As appropriately outlined in Section B.1 of the Monitoring Report and confirmed by the Applus+ Certification's verification team during conducted interviews with project representatives, due to an electrical breakdown (that occurred on 15/05/2023) which caused a failure in the LED display of the installed electricity meter (affecting the visualization of the display exclusively), the installed electricity meter was replaced by a backup unit available at the project on the same day. As also confirmed by the Applus+ Certification's verification team, while the electricity meter was functioning perfectly up to such occurred event and since the meter was replaced on the same day its display presented a failure, measurement records of electricity generated and grid-electricity consumed by the project activity have not been compromised as a result of such occurred event. The main specification details of the installed electricity meters are summarized below: <table border="1"> <thead> <tr> <th colspan="2">Specifications of the utilized electricity meter in operation from 01/03/2023 to 15/05/2023:</th></tr> </thead> <tbody> <tr> <td>Manufacturer</td><td>Schneider Electric</td></tr> <tr> <td>Model</td><td>ION 8650</td></tr> <tr> <td>Serial Number (S/N)</td><td>MW-1805A274-02</td></tr> <tr> <td>Accuracy</td><td>±0.10%</td></tr> </tbody> </table> Source: ^{/39/}	Specifications of the utilized electricity meter in operation from 01/03/2023 to 15/05/2023:		Manufacturer	Schneider Electric	Model	ION 8650	Serial Number (S/N)	MW-1805A274-02	Accuracy	±0.10%
Specifications of the utilized electricity meter in operation from 01/03/2023 to 15/05/2023:											
Manufacturer	Schneider Electric										
Model	ION 8650										
Serial Number (S/N)	MW-1805A274-02										
Accuracy	±0.10%										

	Specifications of the utilized electricity meter in operation from 15/05/2023 to 26/11/2023: <table><tr><td>Manufacturer</td><td>Schneider Electric</td></tr><tr><td>Model</td><td>ION 8650</td></tr><tr><td>Serial Number (S/N)</td><td>MW-2105A816-02</td></tr><tr><td>Accuracy</td><td>±0.10%</td></tr></table> Source: ^{/39/} The Transition Request Form + GS4GG PDD ^{/02/} and/or ACM0001 (Version 19.0) ^{/06/} do not specify any accuracy requirement for the electricity meters. The accuracy range for the installed measuring instruments is ±0.10%. Based on its expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is Applus+ Certification opinion that the use of the installed instruments represents good practice for monitoring of consumption of grid-sourced electricity.	Manufacturer	Schneider Electric	Model	ION 8650	Serial Number (S/N)	MW-2105A816-02	Accuracy	±0.10%								
Manufacturer	Schneider Electric																
Model	ION 8650																
Serial Number (S/N)	MW-2105A816-02																
Accuracy	±0.10%																
Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed electricity meters are to be calibrated every 5 years. As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed electricity meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer. Electricity meter S/N MW1805A27402 in operation from 01/03/2023 to 15/05/2023: <table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>17/08/2018</td><td>CAL0062018</td><td>3C Services S.A.</td><td>16/08/2023</td></tr></table> Source: ^{/24/} Electricity meter S/N MW2105A81602 in operation from 15/05/2023 to 26/11/2023: <table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>24/08/2021</td><td>CAL0562021</td><td>3C Services S.A.</td><td>23/08/2026</td></tr></table> Source: ^{/24/} Calibration Certificates for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.	Calibration date	Certificate number	Company performing the calibration event	Validity	17/08/2018	CAL0062018	3C Services S.A.	16/08/2023	Calibration date	Certificate number	Company performing the calibration event	Validity	24/08/2021	CAL0562021	3C Services S.A.	23/08/2026
Calibration date	Certificate number	Company performing the calibration event	Validity														
17/08/2018	CAL0062018	3C Services S.A.	16/08/2023														
Calibration date	Certificate number	Company performing the calibration event	Validity														
24/08/2021	CAL0562021	3C Services S.A.	23/08/2026														

	As per both the Transition Request Form + GS4GG PDD for the GS project activity and ACM0001 (Version 19.0) ^{/06/}, the installed electricity meters are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (5 years, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/}. As also confirmed by Applus+ Certification's verification team the performed calibration events for the electricity meters confirmed proper functioning of the measurement instrument. Moreover, as outlined in the Monitoring Report ^{/04/}, there are no relative delays in performing the calibration events for the installed electricity meters.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Records of grid-sourced electricity consumed during the considered monitoring period, as reported in the emission reduction calculation spreadsheet ^{/05/} and Monitoring Report ^{/04/} were cross-checked with monthly reports of grid-sourced electricity purchase issued by Câmara de Comercialização de Energia Elétrica (CCEE) (Electric Energy Trading Chamber) ^{/16/} which were made available and assessed by the Applus+ Certification's verification team. Such cross-checking confirmed correctness of reported data for $EC_{p,grid,y}$ during the considered monitoring period.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.
Data / Parameter: (as per the monitoring plan of the PDD):	Operating margin CO₂ emission factor in year y = Dispatch data analysis operating margin CO₂ emission factor in year y ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$)
Measuring, recording and reporting frequencies:	While the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is required to be monitored yearly, for the considered monitoring period within year 2023, the applicable value for this monitoring period is selected.

	As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, monitoring of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is to be performed yearly. Moreover, the "Tool to calculate the emission factor for an electricity system" (version 07.0) ^{/15/} specifies the monitoring frequency for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ as yearly. Thus, the applied monitoring frequency is thus in accordance with both "Tool to calculate the emission factor for an electricity system" (version 07.0) ^{/15/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity. For the considered monitoring period, $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is correctly selected as follows: - 0.<del>3786</del>~~3984~~ tCO₂/MWh (calculated value applicable for the ~~year 2023~~ period from March/2023 to November/2023 as published by the CDM's Designated National Authority (DNA) for Brazil).
Type of monitoring equipment/instrument:	Not applicable
Calibration frequency	Not applicable
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	As confirmed by the Applus+ Certification verification team, the DNA of Brazil has regularly calculated value of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ for the National Electricity Grid of Brazil by applying classified information and data on dispatch of electricity by grid-connected power plants within the National Electricity Grid of Brazil and by following the applicable guidance of the methodological tool "Tool to calculate the emission factor for an electricity system" (version 07.0) ^{/15/}. Related clarifications and details for the determination of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ by the DNA of Brazil are made available at a specific section of the website of the DNA of Brazil ^{/26/}. Information made available in the website of the DNA of Brazil confirms the correctness of the selected value for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$. The Applus+ Certification verification team also confirmed as part of its performed assessment that <i>ex-post</i> determined values for both $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ and Build margin CO₂ emission factor ($EF_{grid,BM,y}$) on the basis of information published by the DNA of Brazil have been selected and applied for the determination of both baseline and project emissions related to electricity generation and consumption respectively in projects hosted in Brazil with full acceptance from the DOEs involved in the assessments and from the GS4GG. The selected value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ valid for the year 2023 was confirmed by the Applus+ Certification verification to correctly represent the official value as published by the DNA of Brazil (available online:

	https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao). In summary, it is Applus+ Certification opinion that the selection and reporting of the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is deemed correct and acceptable.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	As confirmed by the Applus+ Certification verification team, the DNA of Brazil has regularly calculated values of $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ and $EF_{grid,BM,y}$ for the National Electricity Grid of Brazil by applying classified information and data on dispatch of electricity by grid-connected power plants within the National Electricity Grid of Brazil. The Applus+ Certification verification team also confirmed as part of its performed assessment that, for applicable cases, <i>ex-post</i> monitored values for $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ and the ex-ante determined value for $EF_{grid,BM,y}$ based on information published by the DNA of Brazil ^{/26/} have been systematically selected and applied for the determination of both baseline and project emissions related to electricity generation and consumption respectively in CDM projects hosted in Brazil with full acceptance both from the DOEs involved in the assessments and from the CDM-EB. The selected value for the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ and the previously selected 2017 vintage value for the ex-ante determined parameter $EF_{grid,BM,y}$ were confirmed by the Applus+ Certification verification team to correctly represent the official values as published by the DNA of Brazil ^{/26/}. In summary, it is Applus+ Certification's opinion that the selection and reporting of the monitoring parameter $EF_{grid,OM,y} = EF_{grid,OM-DD,y}$ is deemed correct and acceptable.
Data / Parameter: (as per the monitoring plan of the PDD): Measuring, recording and reporting frequencies:	Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) During the considered monitoring period, the operational status of each one of the 4 internal combustion gas engines combusting LFG were recorded and reported every-minute on the basis of continuous measurements of the operational status of each gas engine (on the basis of the 4 sub parameters $O_{engine-1,h}$, $O_{engine-2,h}$, $O_{engine-3,h}$ and $O_{engine-4,h}$). As confirmed by the Applus+ verification team through assessment of the monthly emission reduction calculation spreadsheets valid for the considered monitoring period, for every minute <i>m</i> that a particular gas engine was operational, the operational status for this particular minute is set as 1 (1 = "on") for the gas engine in question, otherwise the operational status is set to 0 (0 = "off").

	As per both the registered Transition Request Form + GS4GG PDD /02/ and ACM0001 (version 19.0) /06/, the operational status of each internal combustion gas engine shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for $O_{pj,h}$ are thus in accordance with both ACM0001 (version 19.0) /06/ and the Transition Request Form + GS4GG PDD /02/.
Type of monitoring equipment/instrument:	Not applicable. The operational status the 4 internal combustion gas engines, as automatically detected by the electronic control system for each gas engine based on functional parameters, is sent to the project's control system infrastructure and recorded as monitoring data.
Calibration frequency	Not applicable
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m (Flame_m) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet /05/ includes only authentic monitoring records.

	Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.														
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable														
Data / Parameter: (as per the monitoring plan of the PDD):	Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$)														
Measuring, recording and reporting frequencies:	During the considered monitoring period, continuous measurements of the monitoring parameter $T_{EG,m}$ were recorded and reported with every minute frequency. As per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, measurements of $T_{EG,m}$ are to be performed continuously. Moreover, ACM0001 (Version 19.0) ^{/06/} does not specify any monitoring frequency for $T_{EG,m}$ the applied measuring, recording and reporting frequencies are thus in accordance with both ACM0001 (Version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.														
Type of monitoring equipment/instrument:	Continuously measurements of temperature in the exhaust gas of the flare were confirmed as being performed by two thermocouples used alternately during the considered monitoring period (due to calibration schedules). Their main specification details are summarized below: <table border="1"> <thead> <tr> <th colspan="2">Specifications of the utilized thermocouple in operation from 01/01/2023 to 15/05/2023</th></tr> </thead> <tbody> <tr> <td>Serial number</td><td>N2148.256595</td></tr> <tr> <td>Accuracy</td><td>±0.15K or ±0.15% of span</td></tr> <tr> <td>Model</td><td>APAQ-C130</td></tr> <tr> <td>Manufacturer</td><td>Inor Process AB</td></tr> </tbody> </table> Source: ^{/40/} <table border="1"> <thead> <tr> <th colspan="2">Specifications of the utilized thermocouple in operation from 15/05/2023 to 26/11/2023</th></tr> </thead> <tbody> <tr> <td>Serial number</td><td>N2010.963442</td></tr> </tbody> </table>	Specifications of the utilized thermocouple in operation from 01/01/2023 to 15/05/2023		Serial number	N2148.256595	Accuracy	±0.15K or ±0.15% of span	Model	APAQ-C130	Manufacturer	Inor Process AB	Specifications of the utilized thermocouple in operation from 15/05/2023 to 26/11/2023		Serial number	N2010.963442
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	Accuracy	±0.15K or ±0.15% of span		
	Model	PT100		
	Manufacturer	Ecil Produtos e Sistemas de Medição e Controle de Temperatura		
	Source: /40/			
	The Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/ do not specify any accuracy requirement for the thermocouples installed at the project site. Based on its sectoral expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is the opinion of the Applus+ Certification's verification team that the use of the installed instruments represents good practice for monitoring of temperature in the exhaust gas of the enclosed flare.			
Calibration frequency	As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed thermocouples are to be calibrated every 1 year. As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed thermocouples, the selected calibration frequency is as per the recommendations of the instrument manufacturer.			
	Calibration event valid for thermocouple with S/N N2148.256595:			
	Calibration date	Certificate number	Company performing the calibration event	Validity
	27/06/2022	6947/22	Ecil Produtos e Sistemas de Medição e Controle Ltda.	26/06/2023
	Source: /25/			
Calibration frequency	Calibration event valid for thermocouple with S/N N2010.963442:			
	Calibration date	Certificate number	Company performing the calibration event	Validity
	02/02/2023	T-0188/23	CTJ Metrologia Comércio e Serviços Ltda.	01/02/2024
	Source: /25/			
	The above-summarized calibration certificates were made available and assessed by the Applus+ Certification's verification team.			
Calibration frequency	As per both the Transition Request Form + GS4GG PDD /02/ for the GS project activity and ACM0001 (Version 19.0) /06/, the			

	installed thermocouples are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (1 year, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/}. As also confirmed by Applus+ Certification's verification team the performed calibration events for the thermocouples confirmed proper functioning of the measurement instruments. Moreover, as outlined in the Monitoring Report ^{/04/}, there are no relative delays on performing the calibration events for the installed thermocouples.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m (Flame_m) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet ^{/05/} includes only authentic monitoring records.

	Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.
Data / Parameter: (as per the monitoring plan of the PDD):	Flame detection of flare in the minute m (Flame _m)
Measuring, recording and reporting frequencies:	During the considered monitoring period, the operational status of the flares was recorded and reported every minute on the basis of continuous measurements of the status of flame in the flares. As correctly outlined in the latest version of the Monitoring Report ^{/04/}, while measurements for Flame_m are performed by the installed UV flame detector. This is deemed correct, acceptable and in conformance with requirements of ACM0001 (version 19.0) ^{/06/} and applicable methodological tools. As confirmed by the Applus+ verification team through assessment of the monthly emission reduction calculation spreadsheets ^{/05/}, for every minute m during which flame was detected in the flare, the flame status of the measured flare for each minute is set as "ON" (Flame "on"), otherwise the flame status of this flare for the given minute is set to "OFF" (Flame "off"). As per both the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/}, (which is applied in accordance with ACM0001 (version 19.0) ^{/06/}), the operational status of the flare shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for Flame_m are thus in accordance with both ACM0001 (version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.

Type of monitoring equipment/instrument:	Monitoring of the operational status of the flare is confirmed as being performed by installed UV flame detector as follows: <table border="1" data-bbox="459 577 903 680"> <thead> <tr> <th colspan="2">Specifications of the UV Flame detector</th></tr> </thead> <tbody> <tr> <td>Manufacturer</td><td>Honeywell Kromschroder</td></tr> <tr> <td>Model</td><td>UVS 6</td></tr> <tr> <td>Serial Number</td><td>84315100</td></tr> </tbody> </table> Source: /22/	Specifications of the UV Flame detector		Manufacturer	Honeywell Kromschroder	Model	UVS 6	Serial Number	84315100
Specifications of the UV Flame detector									
Manufacturer	Honeywell Kromschroder								
Model	UVS 6								
Serial Number	84315100								
Calibration frequency	Not applicable. As confirmed by the Applus+ verification team through assessment of the specification sheets /22/ for the UV Flame detector installed at the project site, the installed UV Flame detector has a self-checking function and thus does not require any calibration.								
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m (Flame_m) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet /05/ includes only authentic monitoring records.								

	Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.
Data / Parameter: (as per the monitoring plan of the PDD):	Maintenance events completed in year γ (Maintenance _{γ})
Measuring, recording and reporting frequencies:	As per the implemented monitoring procedure adopted at Orion Valorização de Resíduos S.A., all the maintenance events performed at the project site are by the staff of the project developer and project operator Orion Valorização de Resíduos S.A. in customized maintenance logbooks (with details about historical of performed interventions (repair, maintenance and calibration services) ^{/30/}. As established in the Transition Request Form + GS4GG PDD ^{/02/}, the latest version of the Monitoring Report ^{/04/} summarizes the maintenance events (inspection and maintenance services) that were performed in the installed flare during the considered monitoring period. The listed events (02/02/2023, 13/04/2023, 27/06/2023, 03/11/1023 and 01/03/2024) encompass general inspection/maintenance services (incl. inspection of the condition of the flare isolation ceramics revetment material, checking of condition/function of the air inlet dumpers, checking of the conditions of the thermocouples, checking of the condition of the UV flame detector, checking of the condition of the flame arrester valve, checking of the conditions of the LFG injectors, checking of painting conditions). As also appropriately outlined in the Monitoring Report ^{/04/}, general inspection/maintenance services on the flare are opportunely performed during planned or unplanned interruptions of operation of the flare. As per both the Transition Request Form + GS4GG PDD ^{/02/} and the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/}, (which is applied in accordance with ACM0001 (version 19.0) ^{/06/}), monitoring of the parameter Maintenance_{γ} is to be performed every 6 months. Thus, the applied monitoring frequency for the parameter (with maintenance events being

	registered at the date when the event is performed) is thus in accordance with both ACM0001 (version 19.0) ^{/06/} and the Transition Request Form + GS4GG PDD ^{/02/} .
Type of monitoring equipment/instrument:	Not applicable. There are no measurements involved in the monitoring of Maintenance.
Calibration frequency	Not applicable. There is no calibration frequency involved in the monitoring of Maintenance.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m ($Flame_m$) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet ^{/05/} includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data	Not applicable.



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**management process
(from monitoring
equipment/instrument
to emission reduction
calculation) ensure
correct recording,
transfer and reporting
of data to be used for
the emission reductions
calculations? Are
necessary/applicable
QA/QC processes in
place?**

Data / Parameter: (as per the monitoring plan of the PDD): Measuring, recording and reporting frequencies:	Average technical transmission and distribution losses for providing electricity to the grid and/or for grid-sourced electricity consumed by the project activity ($TDL_{grid,y}$) The value for the monitoring parameter $TDL_{grid,y}$ is selected as: - 3% (for generated electricity exported through the electricity grid the GS project activity is connected to ($TDL_{grid,export,y}$)). - 20% (for electricity imported by the project activity through the electricity grid the GS project activity is connected to ($TDL_{grid,import,y}$)). which correspond to applicable default values as per Option A1 of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}. The determination of $TDL_{grid,y}$ is confirmed as being under conformance with applicable guidance of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}. No measurement was performed in the context of the determination of the parameter $TDL_{grid,y}$ and no monitoring equipment/instrument was used either. Default values as per Option A1 of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} is considered every year monitoring frequency is thus assumed as being applied. This is confirmed as being in conformance with the Transition Request Form + GS4GG PDD ^{/02/}.
Type of monitoring equipment/instrument:	Not applicable.
Calibration frequency	Not applicable.
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The Applus+ verification team confirmed as part of its performed assessment that <i>ex-post</i> determined values for $TDL_{grid,y}$ on the basis of information of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} has been selected and applied for the determination of both baseline and project emissions related to electricity generation and consumption respectively in CDM projects hosted in Brazil with full acceptance both from the DOEs involved in the assessments and from the CDM-EB. The selected values for the monitoring parameter $TDL_{grid,y}$ was confirmed by the Applus+ verification to correctly represent the default value according to the methodological tool "Baseline,

	project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/}. In summary, it is Applus+ verification team opinion that the selection and reporting of the monitoring parameter $TDL_{grid,y}$ is deemed correct and acceptable.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable

Data / Parameter: (as per the monitoring plan of the PDD):	Status of biogas destruction device (Operational status of biogas destruction devices)
Measuring, recording and reporting frequencies:	The operational status of each one of the 4 internal combustion engines is recorded/reported every minute on the basis of the signal from the electronic control system for each internal combustion gas engine. The operational status of the installed high temperature enclosed flare is recorded/reported every minute on the basis of the signal from the UV flame detectors installed in each one of the flares. The Applus+ verification team has confirmed that the following disclaimers are appropriately added in the Monitoring Report ^{/04/}: "It is relevant to note that, for the particular case of the set of 4 internal combustion gas engines, the parameter "Status of biogas destruction device" is monitored on the same basis as the monitoring parameter "Operation of the equipment that consumes LFG" ($Op_{p,h}$) (for each individual internal combustion gas engine through the sub-parameters $Op_{engine-1,h}$, $Op_{engine-2,h}$, $Op_{engine-3,h}$, $Op_{engine-4,h}$) as reported in the monthly emission reductions calculation spreadsheets. It is relevant to note that, for the particular case of the installed high temperature enclosed flare, the parameter "Status of biogas destruction device" is monitored on the same basis as the monitoring parameter "Flame detection of flare in the minute m" ($Flame_m$) as reported in the monthly emission reductions calculation spreadsheets."

	As per both the registered Transition Request Form + GS4GG PDD ^{/02/} and ACM0001 (version 19.0) ^{/06/} , the operational status of each biogas destruction device shall be recorded once per minute. Thus, the applied measuring, recording and reporting frequencies for Status of biogas destruction device are thus in accordance with both ACM0001 (version 19.0) ^{/06/} and the registered Transition Request Form + GS4GG PDD ^{/02/} .
Type of monitoring equipment/instrument:	Not applicable. The operational status of each one of the engine-generator sets, as automatically detected by the electronic control system for each engine-generator set based on functional parameters, is processed by the project's control system infrastructure and recorded as monitoring data. Information details about the UV flame detectors installed on the high temperature enclosed flare used to monitor the operational status of the installed high temperature enclosed flare is presented in the applicable table for the monitoring parameter "Flame detection of flare in the minute m" ($Flame_m$).
Calibration frequency	Not applicable
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Assessment details about recording of values measured at the project site are included in Section 5.6.3. Furthermore, a data authenticity checking was performed for all measurement records of the following LFG and LFG flaring/utilization related monitoring parameters to demonstrate and ensure that only authentic/not modified monitoring data was used as input data for the emission reduction calculations for the considered monitoring period: - Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$) - Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$) - Temperature of the LFG stream in time interval t (T_t) - Pressure of the LFG stream in time interval t (P_t) - Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$) - Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) - Flame detection of flare in the minute m ($Flame_m$) The performed checking aimed to ensure that monitoring data were not intentionally or unintentionally edited/modified by anyone prior of being used as primary data input for the

	processing of emission reduction calculations. The performed checking also aimed to ensure that the emission reduction calculation spreadsheet ^{/05/} includes only authentic monitoring records. Details about the performed data authenticity checking (which is valid for listed LFG and LFG flaring/utilization related monitoring data) are included in Section 5.8.
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable

SDG 7 and SDG 13:

Data / Parameter: (as per the monitoring plan of the PDD):	Amount of electricity generated using LFG by the project activity in year γ ($EC_{BL,\gamma}$)
Measuring, recording and reporting frequencies:	During the considered monitoring period, accumulated values of continuous measurements of $EC_{BL,\gamma}$ were aggregated and recorded/reported monthly by the monitoring staff of the GS project activity. For the considered monitoring period, the accumulated value of $EC_{BL,\gamma}$ was reported as 29,471 MWh. As per the as per the Transition Request Form + GS4GG PDD for the GS project activity, the parameter $EC_{BL,\gamma}$ is to be monitored continuously. ACM0001 (Version 19.0) ^{/06/} and the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) ^{/11/} do not clearly indicate recording and reporting frequencies for continuous measurements for the parameter $EC_{BL,\gamma}$. Thus, the adopted measuring, recording and reporting frequency for $EC_{BL,\gamma}$ is assumed as in accordance with the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, the Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion and ACM0001 (Version 19.0) ^{/06/}.
Type of monitoring equipment/instrument:	Continuous measurements of grid electricity consumed by the project activity were confirmed as being performed by two electricity meters used alternately during the considered monitoring period. As appropriately outlined in Section B.1 of the

Monitoring Report and confirmed by the Applus+ Certification's verification team during conducted interviews with project representatives, due to an electrical breakdown (that occurred on 15/05/2023) which caused a failure in the LED display of the installed electricity meter (affecting the visualization of the display exclusively), the installed electricity meter was replaced by a backup unit available at the project on the same day. As also confirmed by the Applus+ Certification's verification team, while the electricity meter was functioning perfectly up to such occurred event and since the meter was replaced on the same day its display presented a failure, measurement records of electricity generated and grid-electricity consumed by the project activity have not been compromised as a result of such occurred event.

The main specification details of the installed electricity meters are summarized below:

Specifications of the utilized electricity meter in operation from 01/03/2023 to 15/05/2023:

Manufacturer	Schneider Electric
Model	ION 8650
Serial Number (S/N)	MW-1805A274-02
Accuracy	±0.10%

Source: ^{/39/}

Specifications of the utilized electricity meter in operation from 15/05/2023 to 26/11/2023:

Manufacturer	Schneider Electric
Model	ION 8650
Serial Number (S/N)	MW-2105A816-02
Accuracy	±0.10%

Source: ^{/39/}

The Transition Request Form + GS4GG PDD ^{/02/} and/or ACM0001 (Version 19.0) ^{/06/} do not specify any accuracy requirement for the electricity meters. The accuracy range for the installed measuring instruments is ±0.10%. Based on its expertise and experience with similar project-based initiatives promoting LFG collection and destruction/utilization, it is Applus+ Certification opinion that the use of the installed instruments represent good practice for monitoring of electricity generated by the project activity.

Calibration frequency

As per the implemented monitoring procedure at Ecoparque João Pessoa Landfill and recommendations from the equipment's manufacturer, the installed electricity meters are to be calibrated every 5 years. As confirmed by the Applus+ Certification's verification team through assessment of the specification sheet for the installed electricity meters, the selected calibration frequency is as per the recommendations of the instrument manufacturer ^{/39/}.

	Electricity meter S/N MW1805A27402 in operation from 01/03/2023 to 15/05/2023:								
	<table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>17/08/2018</td><td>CAL0062018</td><td>3C Services S.A.</td><td>16/08/2023</td></tr></table>	Calibration date	Certificate number	Company performing the calibration event	Validity	17/08/2018	CAL0062018	3C Services S.A.	16/08/2023
	Calibration date	Certificate number	Company performing the calibration event	Validity					
	17/08/2018	CAL0062018	3C Services S.A.	16/08/2023					
	Source: ^{/24/}								
	Electricity meter S/N MW2105A81602 in operation from 15/05/2023 to 26/11/2023:								
	<table><tr><th>Calibration date</th><th>Certificate number</th><th>Company performing the calibration event</th><th>Validity</th></tr><tr><td>24/08/2021</td><td>CAL0562021</td><td>3C Services S.A.</td><td>23/08/2026</td></tr></table>	Calibration date	Certificate number	Company performing the calibration event	Validity	24/08/2021	CAL0562021	3C Services S.A.	23/08/2026
	Calibration date	Certificate number	Company performing the calibration event	Validity					
	24/08/2021	CAL0562021	3C Services S.A.	23/08/2026					
	Source: ^{/24/}								
Calibration Certificates for the above-summarized calibration events were made available and assessed by the Applus+ Certification's verification team.									
As per both the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/} , the installed electricity meters are to be calibrated in a frequency as per the instrument's specifications and/or instrument manufacturer's recommendations. Thus, the adopted calibration frequency (5 years, as per recommendations from the equipment's manufacturer) is in line with both the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and ACM0001 (Version 19.0) ^{/06/} .									
As also confirmed by Applus+ Certification's verification team the performed calibration events for the electricity meters confirmed proper functioning of the measurement instruments.									
Moreover, as outlined in the Monitoring Report ^{/04/} , there are no relative delays in performing the calibration events for the installed electricity meters.									
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	Records of electricity generated during the considered monitoring period, as reported in the emission reduction calculation spreadsheet ^{/05/} and Monitoring Report were cross-checked with the monthly reports made available by Electric Energy Trading Chamber (CCEE) ^{/36/} which were made available and assessed by the Applus+ Certification's verification team. Such cross-checking confirmed correctness of reported data for EC _{BL,y} during the considered monitoring period.								

Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Yes. Details for data transfer and reporting of emission reductions (incl. relevant QA/QC process) are further assessed in Section 5.8.
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SDG 8:

Data / Parameter: (as per the monitoring plan of the PDD):	Number of employees related to the operation of the project activity (Total number of jobs)
Measuring, recording and reporting frequencies:	The number of employees related to the operation of the project activity during each is registered at the end of each year.
Type of monitoring equipment/instrument:	Not applicable
Calibration frequency	Not applicable
How were the values in the Monitoring Report (and/or supporting documents, i.e emission reduction calculation spreadsheet) verified and/or compared?	The Applus+ Certification's verification team has confirmed through assessment of a list of all the employees from the project developer Orizon Valorização de Resíduos S.A. which are directly involved in the operation of the GS project activity ^{/48/}, that the following reported number of individuals associated with the operation of the GS project activity were registered as employees/collaborators under conformance with procedures and requirements of the Brazilian labour legislation framework: - 6 jobs in 2023 (6 males) As outlined in the Transition Request Form + GS4GG PDD ^{/02/}, as an additional monitoring requirement, the project developer shall also monitor the quality of the jobs created, on the basis of, inter alia: - Conformity with national Labor Laws - Availability of Personnel Protection Equipment (PPE) a safety/health instructions and procedures

- Control of personnel working hours and overtime pay

The Applus+ Certification's verification team has assessed the information about the topics quoted above as presented in the Monitoring Report ^{/4/} as follows:

"The project developer Orizon Valorização de Resíduos S.A. has strict policies regarding conformity with national Labour Laws for its employees."

The Applus+ Certification's verification team has assessed the project developer's policies on hiring of employees and compliance with labor laws (as presented in the company's latest Annual Sustainability Report ^{/52/}). The Applus+ Certification's verification team has also assessed a Declaration ^{/61/} issued by a third-party specialist (Mr. José Carlos W. Fagundes, labor lawyer) confirming that related company policies are under conformance with related national labor laws.

"Regarding safety and health issues, there are rigid procedures implemented at both the JP landfill and the project activity, as can be demonstrated at both company's guidelines "Programa de Controle Médico de Saúde Ocupacional" (translated as "Medical Control Program of Occupational Health") and "Programa de Gerenciamento de Riscos" (translated as "Risk Management Program"), which are updated every year."

The Applus+ Certification's verification team has assessed the documents quoted above valid for the year 2023 ^{/57/ /58/} and confirmed that the safety and health procedures established in such programs cover all the aspects to create a healthy and safe work environment at the landfill site, by considering the typical working conditions in a landfill and a LFG collection/utilization project. Moreover, the Applus+ Certification's verification team has also confirmed, during the conducted remote visit, that adequate Personnel Protection Equipment (PPE) are available for all the employees at the landfill site and its use is mandatory in accordance with the company's Risk Management Program.

"Regarding control of personnel working hours and overtime pay, all the company's employees must use the Employees Time Report, which shows the time each employee arrives and leaves the landfill. Any extra hours beyond those which are mandatory as per each individual contractual agreement are remunerated as extra hours. The company also provides its employees with thirteenth month pay and remunerated vacations."

The Applus+ Certification's verification team has assessed the "Employees Time Report" ^{/59/} for the employees related to the operation of the project activity and confirmed that indeed the amount of working hours for each employee is accounted, with

	any extra hour, additional nightly pay, remunerated vacations and additional health and safety related payments being appropriately remunerated (as demonstrated in the summarized Monthly Payment Reports for the employees ^{/60/}).
Does the applied monitoring data management process (from monitoring equipment/instrument to emission reduction calculation) ensure correct recording, transfer and reporting of data to be used for the emission reductions calculations? Are necessary/applicable QA/QC processes in place?	Not applicable.

It is important to note that the monitoring plan of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity also includes the following monitoring parameters of which monitoring was not required during the considered monitoring period due to the chosen approach for baseline calculations:

Parameters not monitored during the considered monitoring period
Volumetric flow of LFG stream in time interval t on a dry basis ($V_{t,db}$)
Volumetric fraction of CH_4 in the collected LFG in time interval t on a dry basis ($v_{CH_4,t,db}$)
Mass flow of the LFG stream in time interval t on dry basis ($M_{t,db}$)
Saturation pressure of H_2O at temperature T_t in time interval t ($P_{H_2O,t,Sat}$)
Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t ($F_{CH_4,EG,t}$)
Average technical transmission and distribution losses for electricity sourced by the captive electricity generator ($TDL_{captive,y}$)

The Applus+ Certification's verification team has confirmed that, as also correctly indicated in the Monitoring Report ^{/04/}, since the installed backup captive off-grid electricity generator (fueled by Diesel) did not operate during the whole considered monitoring period, the monitoring parameter "Quantity of electricity consumed from diesel generator by the project activity during the year y " ($EC_{PJ,captive}$) was also not used for the determination of emission reductions achieved by the project activity during the considered monitoring period.

5.7.3. Handling of monitoring data and creation of emission reductions calculation spreadsheet files

As part of the applied monitoring procedure, measurements for the following LFG and flaring related monitoring parameters were automatically processed by the Programmable Logic Controller (PLC) unit and recorded in a customized database with a data recording/reporting frequency of every one minute along the considered monitoring period:

- Volumetric flow of the LFG stream in time interval t on a wet basis ($V_{t,wb}$)
- Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis ($V_{CH_4,t,wb}$)
- Temperature of the LFG stream in time interval t (T_t)
- Pressure of the LFG stream in time interval t (P_t)
- Operation of the equipment that consumes the LFG (engine-generator sets of the electricity generation infrastructure) ($O_{pj,h}$)
- Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$)
- Flame detection of flare in the minute m ($Flame_m$)

As confirmed by the Applus+ Certification's verification team, the project's customized database for monitoring records is directly connected to the project's data supervisor system. As per the operation of the project's customized data supervisor system, data files are generated every day, (with summarized files being registered at the end of each month (monthly "raw-data" MS-Excel-format files)).

As part of the implemented monitoring procedure, monthly MS-Excel format "raw-data" files ^{/41/} (containing every-minute measurement data for the above-quoted monitoring parameters) resulted from regular data exports were used as primary monitoring input data for the emission reduction calculations (as established in the applicable work procedure of the GS project activity).

It is the opinion of Applus+ Certification that the use of the applied data supervisor system and data base for recording monitoring details for Ecoparque João Pessoa Landfill Gas Project represents good practice in terms of data acquisition and data archiving. Applus+ Certification was also able to verify that a reliable and robust monitoring mechanism was established, implemented and has been followed by the project developer.

For the considered monitoring period from 01/03/2023 to 26/11/2023, 9 monthly "raw-data" MS-Excel-format files were generated. These MS-Excel "raw-data" files were used as primary monitoring data input for the compilation of the monthly emission reductions calculation spreadsheets. The generated MS-Excel-format "raw-data" files were made available and assessed by the Applus+ Certification's verification team.

As per the adopted monitoring procedure and in accordance with the requirements of ACM0001 (Version 19.0) ^{/06/} and related provisions of the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, GHG emission reductions are calculated based on measurement records and selected default values of the ex-post monitored parameters (of which monitoring details are presented in the tables in Section 5.7.2.) and also by using the values for the ex-ante determined parameters presented in Section 5.7.1.

Baseline emissions for each month encompassed by the considered monitoring period were partially calculated through application of the *blank* version of the spreadsheet template that is developed by the project developer and termed "monthly emission reduction calculation spreadsheet template". This calculation spreadsheet template uses the following data/information as input data for the determination of every-minute and accumulated monthly values for the calculation parameters "Amount of methane in the LFG which is flared and/or used in the project

activity" ($F_{CH_4,PJ,y}$) and "Amount of methane in the LFG that would be flared in the baseline scenario" ($F_{CH_4,BL,y}$):

- Monitoring records included in the MS-Excel format "raw-data" spreadsheet files valid for the monitoring period
- the *ex-ante* determined parameters presented in the table above

An additional calculation spreadsheet (termed "Summarized emission reductions calculation spreadsheet") correctly summarizes the baseline emissions due to destruction of methane by the project activity during the considered monitoring period (by summing the accumulated monthly values for the calculation parameters $F_{CH_4,PJ,y}$ and also summing the accumulated monthly values for the calculation parameters $F_{CH_4,BL,y}$ from each one of the monthly emission reductions calculation spreadsheets valid for the considered monitoring period). Moreover, such summarized spreadsheet also calculates baseline emissions from the displacement of the equivalent amount of electricity generated by the project activity (which would otherwise be generated by existing grid-connected power plants, including fossil-fuel fired power plants (and addition of new power generation units) within the National Electricity Grid of Brazil).

Project emissions due to consumption of grid-sourced electricity by the project activity are also calculated in the summarized emission reduction calculation spreadsheet on the basis of monitoring records (input data) for (i) monitoring parameters that are not automatically recorded/reported by the project's PLC unit (Amount of grid electricity consumed by the project activity ($EC_{PJ,y}$), Operation margin CO₂ emission factor in year y = Dispatch data analysis operating margin CO₂ emission factor in year y ($EF_{grid,OM,y} = EF_{grid,OM-DD,y}$) and Average technical transmission and distribution losses for providing electricity to the grid and/or for grid-sourced electricity consumed by the project activity ($TDL_{grid,y}$) and (ii) related *ex-ante* determined parameters (Weighting of build margin emissions factor (w_{BM}), Weighting of operating margin emissions factor (w_{OM}) and Build margin CO₂ emission factor in year y ($EF_{grid,BM,y}$).

The MS-Excel-format monthly emission reduction calculation spreadsheet files and the summarized emission reduction calculation spreadsheet were made available and assessed by the Applus+ Certification's verification team.

In summary, the Applus+ Certification's verification team was able to confirm that calculations of baseline emissions and project emissions were correctly performed as per the formulae and methods stated in the Transition Request Form + GS4GG PDD (version 3.2)^{/02/} for the GS project activity for Ecoparque João Pessoa Landfill Gas Project, monitoring methodology and applicable tools.

All calculations are thus confirmed by the Applus+ Certification's verification team to be under conformance with applicable requirements from:

- CDM baseline and monitoring methodology ACM0001 – "Flaring or use of landfill gas" (Version 19.0)^{/06/}
- Methodological tool "Emissions from solid waste disposal sites" (Version 08.0)^{/12/}
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0)^{/11/}
- "Project emissions from flaring" (version 04.0)^{/10/}
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)^{/14/}
- "Tool to calculate the emission factor for an electricity system (version 07.0)^{/15/}
- Monitoring plan as per the Transition Request Form + GS4GG PDD^{/02/} for the GS project activity for Ecoparque João Pessoa Landfill Gas Project

5.8 Monitoring Management and Quality Assurance

The Applus+ Certification's verification team was able to confirm that quality control and quality assurance (QA/QC) procedures are implemented by the project developer for preventing or identifying and correct eventual errors or omissions in the reported monitoring parameters.

As verified by the Applus+ Certification's verification team, competent and sufficiently trained staff are recruited for operating the GS project activity and handling related monitoring data. Such employees are found with knowledge not only about the operation of the GS project activity, but also with sufficient knowledge and competence to ensure the application of all related QA/QC procedures for data recording and storage.

Furthermore, the project developer was also supported with consultancy and advisory services in GS4GG and LFG management related issues by the consultancy service company named UniCarbo Energia e Biogás Ltda. As confirmed by the Applus+ Certification's verification team, the technical team from UniCarbo Energia e Biogás Ltda. Has contributed for the development of related documentation (e.g. Monitoring Report ^{/04/} and emission reduction calculation spreadsheet ^{/05/}) and also supported in addressing all raised outstanding issues.

As confirmed by the Applus+ Certification's verification team, the applied procedures for data collection, data reporting, performance of calibration events and other aspects related to the applied procedures for determining the emission reductions are systematically implemented and have been appropriately followed by the project developer. During the conducted remote inspection to the project site, the Applus+ Certification's verification team was also able to verify that the operational structure of the GS project activity is also in line with the information made available in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity of Ecoparque João Pessoa Landfill Gas Project and the Monitoring Report ^{/04/} for the considered monitoring period.

5.9 Data authenticity checking

As part of the performed verification assessment, the Applus+ verification team was able to confirm that the MS-Excel-format monthly calculation spreadsheets ^{/05/} completed by Orizon Valorização de Resíduos S.A. are all basically MS-Excel spreadsheets that, in theory, could have recorded data being easily edited/modified (intentionally or unintentionally). Thus, these spreadsheets, if inappropriately edited, could potentially tamper reported monitoring records, thus resulting in unreal and incorrect calculation and reporting of emission reductions achieved by the project activity during the considered monitoring period. In order to ensure that all emission reductions calculations are entirely and correctly based on authentic and real monitoring records valid for the considered monitoring period, a *data authentic check* was performed as part of the verification assessment.

Such checking aimed to ensure that only authentic and unmodified monitoring data records were used by the project developer Orizon Valorização de Resíduos S.A. for performing the emission reduction calculation for the considered monitoring period (thus ensuring that measurement records made available in the MS-Excel format "raw data" input files ^{/41/} and measurement records reported in the monthly emission reduction spreadsheets ^{/05/} were not intentionally or unintentionally edited/modified during the generation or handling of these files).

The performed *data authenticity checking* involved the following steps:

STEP 1: Assessment and handling of the measurement data:

While each monthly MS-Excel format raw data contains identical every-minute LFG related monitoring records for the whole month period encompassed by the considered monitoring period, the Applus+ verification team has assessed the set of monthly files in MS-Excel format (with primary data inputs from the project's data supervisor system) retrieved from the project's data supervisor system during the production of the live videos (movies) ^{/49/}. These comparative files were termed by the Applus+ verification team as "raw-data for checking" files ^{/13/}.

STEP 2: Re-calculation of emission reductions:

By using the set of MS-Excel format "raw-data for checking" comparative files ^{/13/} (that were generated under STEP 1) as input data, the procedure for emission reductions calculation for the whole monitoring period was later reproduced by the Applus+ verification team for all months encompassed by the considered monitoring period. The content of the "raw-data for checking" comparative files ^{/13/} was used as input data for the comparative monthly emission reduction calculation spreadsheets ^{/42/} by applying *blank* versions ^{/43/} of the emission reduction calculation spreadsheet that were both made available by the project developer. Moreover, correct values for the applicable *ex-ante* determined parameters were also inserted in the *blank* version ^{/43/} of the emission reduction calculation spreadsheet ^{/05/} as input data. As a result of this step, a set of 9 comparative monthly emission reduction spreadsheets ^{/42/} was thus created.

STEP 3 – Comparison of emission reduction calculation spreadsheets developed by the project developer against the created comparative monthly emission reduction spreadsheets and analysis of the results:

As a result of STEP 3, by comparing files previously generated by the project developer against the files generated under STEP 2, the Applus+ verification team was able to confirm that the generated set of comparative monthly checking spreadsheets ^{/42/} are identical to the monthly emission reduction calculation spreadsheets ^{/05/} previously created by the project developer. While no quantitative deviations or differences were identified when comparing the accumulated values for the calculation parameters presented in these files, and by assuming that all encrypted data stored in the project's data supervisor system represent credible and authentic monitoring data, the performed *data authenticity checking* thus successfully and sufficiently confirmed that only authentic and not-modified monitored measurement data (from the project's data supervisor system) were previously used by the project developer Orizon Valorização de Resíduos S.A. for the calculation of emission reductions as reported in the Monitoring Report ^{/04/}.

5.10 Assessment of Data and Calculation of Greenhouse Gas Emission Reductions

5.10.1. Assessment of determination of baseline emissions

The Applus+ Certification's verification team assessed whether the methods and formulae applied to determine baseline emissions of the GS project activity for the considered monitoring period are appropriate and under conformance with applicable requirements.

The performed assessment encompassed checking whether applied methods and formulae (as defined in the monitoring plan as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and applied CDM baseline and monitoring methodology + applied CDM

methodological tools were correctly applied and reported, including confirmation whether the Monitoring Report ^{/04/} includes all parameters and monitored data at the required intervals.

The correct application of emission factor and default values (ex-ante determined/fixed parameters) as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity was also verified.

The Applus+ Certification's verification team was able to verify that, as correctly reported in the Monitoring Report and under conformance with ACM0001 (Version 19.0) ^{/06/} and applied CDM methodological tools and also under conformance with the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, baseline emissions during the considered monitoring period are correctly calculated as follows (as defined by the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity):

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

Assessment of Baseline emissions of methane from the SWDS in year y :

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

Where:

OX_{top_layer} Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline. As outlined in the Monitoring Report, OX_{top_layer} is *ex-ante* determined as 10%. This value represents the *ex-ante* determined value as per the Transition Request Form + GS4GG PDD for the GS project activity.

$GWP_{CH_4,y}$ Global warming potential of CH_4 . As outlined in the Monitoring Report ^{/04/}, $GWP_{CH_4,y}$ is *ex-ante* determined as 28. This value represents the *ex-ante* determined value as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity.

$F_{CH_4,BL,y}$ Amount of methane in the LFG that would be flared in the baseline in year y . $F_{CH_4,BL,y}$ is calculated as follows:

$$F_{CH_4,BL,y} = 0.2 * F_{CH_4,PJ,y}$$

As appropriately outlined in the latest version of the Monitoring Report, this calculation parameter is correctly determined as 0.2 times the total amount of captured methane that is sent to the flare and to the engine-generator sets for combustion during each the minute m within the considered monitoring period. As confirmed by the Applus+ verification team, the calculated accumulated value for $F_{CH_4,BL,y}$ for the considered monitoring period is correctly determined as 1,760 t CH_4 .

$F_{CH_4,PJ,y}$ Amount of methane in the LFG which is flared and/or used in the project activity in year y . As outlined in the latest version of the Monitoring Report and in accordance with the Transition Request Form + GS4GG PDD ^{/02/}, $F_{CH_4,PJ,y}$ is correctly determined 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 in the LFG which is used for electricity generation in year y . As outlined in the latest version of the Monitoring Report and in accordance with the Transition Request Form + GS4GG PDD ^{102/}, $F_{CH_4,EL,y}$ is correctly determined as follows:

$$F_{CH_4,EL,y} = V_{t,wb} * v_{i,t,wb} * \rho_{i,n}$$

Where:

$V_{t,wb}$ Volumetric flow of the gaseous stream (LFG) sent to the engine-generator sets in time interval t on a wet basis. As confirmed by the Applus+ verification team, while continuous measurements of volumetric flow of the gaseous stream are processed, recorded and reported in Nm³ wet gas/h (normal conditions). Further assessment details for the monitoring parameter $V_{t,wb}$ are included in Section 5.7.2.

$v_{i,t,wb}$ Volumetric fraction of greenhouse gas i in a time interval t on a wet basis. Further monitoring details about the monitoring parameter $v_{i,t,wb}$ are included in Section 5.7.2.

$\rho_{i,n}$ Density of greenhouse gas i in the gaseous stream in normal conditions. As per the selected determination procedure of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0) ^{114/}, $\rho_{i,n}$ is calculated as follows:

$$\rho_{i,n} = (P_t * MM_i) / (R_u * T_t)$$

Where:

P_n Absolute Pressure at normal conditions. Further assessment details for the ex-ante determined parameter P_n are included in Section 5.7.1.

T_n Temperature at normal conditions. Further assessment details for the ex-ante determined parameter T_n are included in Section 5.7.1.

MM_i Molecular mass of greenhouse gas i ($i = CH_4$). *Ex-ante* determined as 16.04 kg/mol.

R_u Universal ideal gases constant. *Ex-ante* determined as 8,314 Pa.m³/kmol.K.

The Applus+ verification team was able to verify that the value of the parameter $\rho_{i,n}$ was correctly calculated and reported as 0.7160 kgCH₄/m³CH₄.

As also confirmed by the Applus+ verification team, as established in the Transition Request Form + GS4GG PDD ^{/02/} and presented in the monthly emission reduction calculation spreadsheets, for each one of the 4 internal combustion gas engine, the amount of methane destroyed for minute m for a particular gas engine is directly accounted as 0 (zero) in case such methane destruction device is monitored as “not working” in such minute m (on the basis of available every-minute records for the parameter $Op_{j,h}$ (sub-parameters $Op_{engine-1,h}$, $Op_{engine-2,h}$, $Op_{engine-3,h}$ and $Op_{engine-4,h}$). All related calculations are presented in the monthly emission reduction calculation spreadsheets that are enclosed with the Monitoring Report. As confirmed by the Applus+ Certification’s verification team, the accumulated value of $F_{CH_4,EL,y}$ for the considered monitoring period was correctly determined and reported as 6,120 tCH₄,

$F_{CH_4,flared,y}$ Amount of methane in the LFG which is destroyed by flaring in year y . Under conformance with applicable requirements from the Transition Request Form + GS4GG PDD ^{/02/} and by correctly following the applicable guidance of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/14/}, each value is correctly determined as the difference between the amount of methane supplied to the flare and residual methane project emissions from combustion of LFG for 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 . The Applus+ Certification’s verification team was able to verify that every minute values of the calculation parameter $F_{CH_4,sent_flare,y}$, were determined by correctly following the applicable guidance of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/14/} as also established in the Transition Request Form + GS4GG PDD ^{/02/}. All formulae of the methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) ^{/14/} were correctly applied in the emission reduction calculation spreadsheet and presented in the Monitoring Report.

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream in year y . The Applus+ Certification’s verification team was able to verify that every minute values of the calculation parameter $PE_{flare,y}$, were determined by correctly following the applicable guidance of the methodological tool

"Project emissions from flaring" (version 04.0) ^{/10/} as also established in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity. All formulae of the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/} were correctly applied in the context of flare efficiency calculation in the emission reduction calculation spreadsheet and presented in the Monitoring Report.

As confirmed by the Applus+ Certification's verification team, the accumulated value of $F_{CH_4, flared, y}$ for the considered monitoring period was correctly determined and reported as 2,683 tCH₄,

Assessment details for determination of every-minute values for $PE_{flare, y}$:

In accordance with applicable guidance from both the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/} and from the registered Transition Request Form + GS4GG PDD ^{/02/}, every-minute values of $PE_{flare, y}$ the operational flare are determined as a function of every-minute records of mass flow of methane sent to the flare ($F_{CH_4, RG, m} = F_{CH_4, sent_flare}$) as well as based on *ex-post* calculated values for flare efficiency for the flare n ($\eta_{flare, m}$). As assessed by the Applus+ verification team, values of $PE_{flare, y}$ are correctly calculated for the considered monitoring period as follows:

$$PE_{flare, y} = GWP_{CH_4} * \sum F_{CH_4, RG, m} * (1 - \eta_{flare, m}) * 10^{-3}$$

Where:

$F_{CH_4, RG, m}$ Methane mass flow in the residual gas. For each minute m of the considered monitoring period values for $F_{CH_4, RG, m}$ are equal to the measured and reported every-minute values of $F_{CH_4, sent_flare}$.

$\eta_{flare, m}$ Flare efficiency in minute m . As confirmed by the Applus+ verification team, for the considered monitoring period, this parameter is determined by following applicable guidance as per Option A (application of default value for flare efficiency) of the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/} were applied for the determination of $\eta_{flare, m}$ for the installed high temperature enclosed flare as follows:

"(...)"

Option A: Default value

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For each one of the high temperature enclosed flares installed as part of the project activity, 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.

(...)"

Moreover, as also indicated in the Monitoring Report ^{/04/}, the following requirement of the methodological tool "Project emissions from flaring" (version 04.0) ^{/10/} is also correctly considered for the determination of every-minute values of $\eta_{\text{flare},m}$ during the considered monitoring period:

"For enclosed flares that are defined as low height flares, the flare efficiency in the minute m ($\eta_{\text{flare},m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B. For example, the default value applied should be 80%, rather than 90%, and if for example the measured value was 99%, then the value to be used shall correspond to 89 (...)"

As confirmed by the Applus+ verification team, for every minute m within the considered monitoring period, $\eta_{\text{flare},m,\text{flare-n}} = 0.80$ (80%) (upon effective demonstration of full compliance with operational and maintenance requirements for the flare) or 0% (in case full compliance with operational and maintenance requirements for the flare is not demonstrated).

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Assessment details for (i) compliance with operational and maintenance requirements for the flares (as established by the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$)) and (ii) consideration of data records for the monitoring parameter "Flame detection of flare in the minute m " ($Flame_m$) for the calculation of every-minute values:

As also confirmed by the Applus+ verification team by assessing the monthly emission reduction spreadsheets, in accordance with the applied monitoring procedure for the project activity, compliance with operational and maintenance requirements for the flares, as established by the *ex-ante* determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$), was correctly considered for the determination and application of values of $\eta_{flare,m}$ for calculating every-minute values of $F_{CH4,flare,y}$ along the considered monitoring period¹².

As also confirmed by the Applus+ verification team through assessment of the monthly emission reduction calculation spreadsheets, data records for the monitoring parameter "Flame detection of flare in the minute m " ($Flame_m$) are also effectively considered for the determination and application of the values of $\eta_{flare,m}$ along the considered monitoring period. For each installed flare, the time the flare has operated is monitored through every-minute monitoring the flame combustion status/condition by using an UV flame detector (of which status signal (flame status "on" or "off") is recorded and reported in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period.

As also assessed by the Applus+ verification team, monitoring requirements related to operational requirements/conditions for the flare (as provided by the manufacturer's specifications for operating conditions as per the *ex-ante*

¹² While all performed maintenance events in the installed flare (including inspection and/or replacement of flare revetment material) were performed in accordance with requirements established in details for the ex-ante determined parameter "Manufacturer's flare specifications for temperature, flow rate and maintenance schedule interval" ($SPEC_{flare}$)), the determination of emission reductions achieved by the project activity during the considered monitoring period are thus not negatively impacted by the records for the monitoring parameter Maintenance.

determined parameter $SPEC_{flare}$ (min. and max. flow of LFG to the set of flares + temperature of exhaust gas of the flares + meeting of maintenance requirements)) are also effectively correctly considered in the context of the determination and application of values for $\eta_{flare,m}$ for calculating every-minute values of $F_{CH_4,flared,y}$ along the considered monitoring period. As also confirmed through assessment of the monthly emission reduction calculation spreadsheets, for each minute m within the considered monitoring period when the flare have combusted LFG by not operating in accordance with the operational criteria as established by the *ex-ante* estimated parameter $SPEC_{flare}$ (in terms of LFG flow, temperature of exhaust gas or maintenance practice), no destruction of methane is accounted for the flare as part of the calculation of every-minute values $F_{CH_4,flared,y}$. This is under full compliance with related requirements from the Transition Request Form + GS4GG PDD ^{/02/}.

Assessment details for the additional monitoring requirements applicable for the simplified monitoring approach of the Appendix of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)) (Use of a single flow meter for multi-use of recovered biogas):

The Applus+ Certification's verification team has confirmed that, as appropriately outlined in the Monitoring Report, during the considered monitoring period collected LFG sent to the project's electricity generation infrastructure was measured by a single LFG flow meter. While the determination of baseline emissions for the considered monitoring period is performed by applying the simplified monitoring approach of the Appendix of the methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0), all additional requirements for the use of such simplified monitoring approach were assessed by the Applus+ Certification's verification team.

The Applus+ Certification's verification team has also confirmed that the design of the installed engine-generator sets of the project's electricity generation infrastructure and the whole construction of the project's electricity generation infrastructure ensure that no collected LFG is vented (directly emitted into the atmosphere) through any one of the installed engine-generators when they are not under operational status.

Whenever the installed engine-generators are under operational status, for all time instants all collected LFG sent to such biogas utilization devices is utilized (combusted) as gaseous fuel for electricity generation.

As also confirmed by the Applus+ Certification's verification team, all installed engine-generator sets are of design and constructions where there is an individual safety/control valve (located in the air/fuel mix intake manifold of each set) that is automatically kept under "closed" status/position whenever the underlying engine-generator set is not under operation.

Through assessment of the monthly emission reductions calculation spreadsheets valid for the considered monitoring, the Applus+ Certification's verification team has also confirmed that the following checking requirements (as described in the Monitoring Report) were fulfilled during the considered monitoring period:

"(...)

- Records of electricity generated by the engine generator sets. It is demonstrated that electricity generation (as the output from operation of such devices) corresponds to the flow of LFG actually consumed by the devices (in energy basis).
- For any time instants (minute *m*) where one or more engine-generator set(s) connected downstream to the utilized single LFG flow meter were under non-operational status, it is demonstrated that the set of remaining engine-generators under operational status have the quantitative capacity to combust the amount of LFG flow that was sent to the underlying engine-generators during the underlying minute *m*."

It is the opinion of the Applus+ Certification's verification team that the applied approach for checking meeting of the underlying condition (as reported in the monthly emission reductions calculation spreadsheets) is deemed reasonable and correct.

Assessment of Baseline emissions associated with electricity generation in year *y*:

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

Where:

$EC_{BL,y}$ Amount of electricity generated using LFG in year *y* (in MWh). The following monthly values for $EC_{BL,y}$ within the considered monitoring period is correctly reported in the Monitoring Report and emission reduction calculation spreadsheet:

Month	Electricity generated (MWh)
March 2023	3,299
April 2023	2,887
May 2023	3,321
June 2023	3,350
July 2023	3,482
August 2023	3,417
September 2023	3,306
October 2023	3,203
November 2023 (from 01/11/2023 to 26/11/2023)	3,202
Total	29,471 MWh

Assessment details for the monitoring parameter $EC_{BL,y}$ valid for the considered monitoring period are included in Section 5.7.2.

$EF_{EL,grid,y}$ Emission factor for grid sourced electricity in year *y* (in tCO₂/MWh). $EF_{EL,grid,y} = EF_{grid,CM,y}$ is to be determined as the combined margin (CM) emission factor

($EF_{grid,CM,y}$) for which assessment details are included below. $EF_{EL,grid,y}$ is calculated as ~~0.0967~~ **1017** tCO₂/MWh for. Assessment details for the monitoring parameter $EF_{EL,grid,y}$ valid for the considered monitoring period are included in Section 5.7.2.

TDL_{grid,y} Average technical transmission and/or distribution losses for providing electricity to the grid and/or for grid sourced electricity consumed by the project activity. As per applied monitoring procedure, the value for $TDL_{grid,exort,y}$ is determined as 3%. The selected value represents the applicable default value as per the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0). Further assessment details are included in Section 5.7.2.

The calculated accumulated value for $F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y}$ for the considered monitoring period is confirmed by the Applus+ Certification’s verification team as correctly determined as 8,803 tCH₄.

The calculated value for BE_y for the considered monitoring period is also confirmed as being correctly determined as 175, ~~492~~ **642** tCO₂e. The emission reduction calculation spreadsheet ^{/05/} (that is enclosed to this Monitoring Report ^{/04/}) includes all calculations related to the determination of $BE_{CH4,y}$ and $BE_{EC,y}$ for the considered monitoring period.

5.10.2. Project emissions

Project emissions for the considered monitoring period are thus calculated as follows:

$$PE_y = PE_{EC,grid,y} + PE_{EC,captive,y}$$

Where:

PE_{EC,grid,y} Emissions from consumption of electricity due to the project activity in year y (tCO₂/year)

PE_{EC,captive,y} Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (tCO₂/year).

Emissions from consumption of electricity due to the project activity in year y ($PE_{EC,grid,y}$):

As correctly outlined in the latest version of the Monitoring Report ^{/04/}, during the considered monitoring period, emissions from consumption of electricity due to the project activity in year y ($PE_{EC,grid,y}$) 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” (version 03.0) ^{/11/} as follows:

$$PE_{EC,grid,y} = EC_{PJ,y} * EF_{EL,grid,y} * (1 + TDL_{grid,y})$$

Where:

EC_{PJ,y} Quantity of grid sourced electricity consumed by the project activity in year y . The following monthly values for consumption of grid-sourced electricity ($EC_{PJ,y}$) within the considered monitoring period are correctly reported in the Monitoring Report ^{/04/} and emission reduction calculation spreadsheet ^{/05/}:

Month	Electricity consumption (MWh)
March 2023	0.226
April 2023	2.847
May 2023	0.183
June 2023	0.316
July 2023	0.277
August 2023	0.252
September 2023	0.056
October 2023	0.114
November 2023 (from 01/11/2023 to 26/11/2023)	0.240
Total	4.511

Assessment details for the monitoring parameter $EC_{PJ,y}$ valid for the considered monitoring period are included in Section 5.7.2.

$TDL_{grid,y}$ 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. $TDL_{grid,import,y}$ is selected as 20%. Further details about the selection of the value and related assessment details for $TDL_{grid,y}$ are included in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and in Section 5.7.2 respectively.

$EF_{EL,grid,y}$ CO₂ emission factor of the Brazilian grid electricity during the year y . In accordance with the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0) ^{/11/} the following generic approach is thus defined as applicable for the determination of $EF_{EL,grid,y}$:

"Where case C.III has been identified, as a conservative simple approach, the emission factor for electricity generation should be the more conservative value between the emission factor determined as per guidance for scenario A and B respectively. This means that the more conservative value should be chosen between a) the result of applying either option A1 or A2 and b) the result of applying either option B1 or B2."

By following the approach referred in the Transition Request Form + GS4GG PDD ^{/02/}, $EF_{EL,grid,y}$ is correctly determined as 1.3 tCO₂/MWh which correctly represents the applicable conservative default value of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0) ^{/11/}.

The calculated value for $PE_{EC,grid,y}$ for the considered monitoring period is correctly determined as 13 tCO₂ (rounded value).

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

The Applus+ Certification verification team was able to verify that, as correctly indicated in the Monitoring Report ^{/04/}, project emission from electricity consumption from the off-grid captive electricity generator (fueled by diesel) are determined as 0 tCO₂ since this generator has not operated during the whole considered monitoring period.

Summary of project emissions:

Total project emissions are correctly calculated and reported as 13 tCO₂ (rounded value) and are correctly considered in the context of the emission reduction calculations.

The summarized emission reduction calculation spreadsheet (that is enclosed to this Monitoring Report ^{/04/}) includes all calculations related to the determination of $PE_{EC,grid,y}$, $PE_{EC,captive,y}$ and PE_y for the considered monitoring period.

5.10.3. Emission reductions

The Applus+ Certification's verification team was able to confirm that reported achieved emission reductions for monitoring period from 01/03/2023 to 26/11/2023 are correctly calculated and reported as the difference between determined accumulated values for baseline emissions and project emissions for the period.

Reported achieved emission reductions are in accordance with all applicable measurement, reporting and calculation requirements as per the monitoring plan of the Transition Request Form + GS4GG PDD, monitoring and baseline methodology ACM0001 - 'Flaring or use of landfill gas' (Version 19.0) ^{/06/} and applicable methodological tools.

As verified by the Applus+ Certification's verification team, emission reductions achieved during the considered monitoring period from 01/03/2023 to 26/11/2023 are correctly calculated and reported as 175,479-629 tCO₂e.



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5.11 Outcomes of SDGs Monitoring

The Applus+ Certification's verification team checked the sustainable development indicator parameters during interviews conducted with representatives of Orizon Valorização de Resíduos S.A. (during the remote audit). It is Applus+ Certification's opinion that the monitoring of the project owner regarding sustainability is in line with the requirement of the GS4GG guidelines. The Applus+ Certification verification team has also assessed the SDG Impact Tool for the GS project activity ^{/55/} in order to confirm that the ex-ante estimated outcomes for the selected SDGs as reported in the Monitoring Report were in accordance with values presented in the Transition Request Form + GS4GG PDD ^{/02/} and SDG Impact Tool ^{/55/}.

The following ex-ante estimates and achieved outcomes of SDG are reported in the Monitoring Report ^{/04/}:

SDG	SDG Impact	Net benefit
SDG 7: Affordable and Clean Energy	Total electricity generated (from renewable energy source)	29,471 MWh
SDG 8: Decent Work and Economic Growth	Total number of jobs	6 jobs in 2023
SDG 13: Climate Action	Amount of GHGs emissions avoided or sequestered	175,479-629 tCO ₂ e

The Applus+ Certification's verification team has confirmed that the reported achieved outcomes for SDG 8, as indicated in the table above, are in accordance with provided documented evidence (list of all the employees directly involved in the operation of the GS project activity during year 2023 ^{/48/}). Moreover, as part of an interview conducted with the representative of the project developer Ms. Mariana Miralles Prado, it was confirmed that regular technical & non-technical trainings were conducted with employees and collaborators related to the operation of the project activity.

5.12 Comparison of actual SDG Impacts with estimates in approved PDD

The Applus+ Certification's verification team assessed the comparison of achieved SDG Impacts with related estimates as per the Transition Request Form + GS4GG PDD ^{/02/}. The results of such comparisons are summarized and assessed below:

SDG	Ex-ante estimation as per the PDD	Achieved
SDG 7: Affordable and Clean Energy	39,297 MWh	29,471 MWh
SDG 8: Decent Work and Economic Growth	6 jobs in 2023	6 jobs in 2023
SDG 13: Climate Action	192,508 tCO ₂ e	175,479-629 tCO ₂ e

Regarding SDG 8, while the latest version of the Transition Request Form + GS4GG PDD ^{/02/} was only completed on 09/02/2024, the estimated number of jobs created by the project activity during the year of 2023 (as indicated in the PDD) was based on the actual number of employees which collaborated with the operation of the project activity during 2023 (6 employees).

The Applus+ Certification's verification team also confirmed that both achieved emission reductions and actual electricity generated by the GS project activity during the considered monitoring period were lower than the estimates as per the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity (about 9.34% for emission reductions and 25% for generated electricity).

In the particular case of SDG 7, while there have been several events during which the project's electricity generation infrastructure was partially or completely out of operation (events which are not considered in the ex-ante estimation of electricity to be generated by the project activity (e.g. unexpected maintenance events and problems with the electricity transmission line to which the project is connected to)), the occurred difference between the estimated and the actual value of electricity generated during the considered monitoring period can be reasonably justified by the occurrence of such unexpected events.

In the particular case of SDG 13, the following main aspect sufficiently justifies the occurred difference between verified emission reductions achieved during the considered monitoring period and the comparable value for *ex-ante* estimation of emission reductions as per the Transition Request Form + GS4GG PDD ^{/02/} for the same time period:

Uncertainties associated with the application of First Order Decay (FOD) multi-phased model for estimating the emission reductions in the Transition Request Form + GS4GG PDD ^{/02/}.

Like any other project activity encompassing LFG collection and destruction/utilization, all potential uncertainties associated with the application of the First Order Decay (FOD) multi-phased model in the context of the *ex-ante* estimation of emission reductions in the Transition Request Form + GS4GG PDD ^{/02/} are applicable for the *ex-ante* estimation of emission reductions for the GS project activity. The Applus+ Certification verification team has confirmed that it is reasonable to assume that the uncertainties associated with the application of such decay model have somehow overestimated the amount of LFG to be generated and collected by the GS project activity during the considered monitoring period.

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5.13 Management and Operational System

The responsibilities of data measurement, collection, verifying, archiving etc. have been clearly defined in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity. The specified procedures have been followed by the designated operational staff of the GS project activity, as confirmed by the Applus+ Certification's verification team during conducted interviews with representatives of Orizon Valorização de Resíduos S.A. Data related to emission reductions calculation as well as monitoring procedures and data collection and aggregation process have been internally reviewed by the management of the monitoring team regularly. In summary, the Applus+ Certification's verification team has confirmed that the implemented management and operational systems of the GS project activity are consistent with the monitoring plan in the Transition Request Form + GS4GG PDD ^{/02/} and have been correctly followed during the considered monitoring period.

All the monitoring data and documents (either hard copies or soft copies) will be kept for two years after the end of the last crediting period or the last issuance of GS VERs for the GS project activity, whichever occurs later.

The Applus+ Certification's verification team has assessed the organizational chart presented in Section C of the Monitoring Report which correctly represents the managerial structure for the project activity, as confirmed during conducted interviews with representatives of Orizon Valorização de Resíduos S.A.

In summary, the Applus+ Certification's verification team has confirmed that the adopted management and operational systems, as described in Section C of the Monitoring Report, are under conformance with provisions of the registered Transition Request Form + GS4GG PDD ^{/02/} and applicable requirements from the applied CDM baseline and monitoring methodology (ACM0001 (Version 19.0) ^{/06/}.

6. SAFEGUARDS REPORTING ASSESSMENT



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The Applus+ Certification's verification team has confirmed that, as outlined in both the Transition Request Form + GS4GG PDD ^{/02/} and the Monitoring Report ^{/04/}, the following Safeguarding Principles were identified as potentially relevant to the GS project activity:

Assessment Questions/Requirements	Applus+ Certification's verification team's assessment of the relevance of safeguarding principle and the proposed mitigation measures
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 organizations. 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 year, not including sick and casual leave.	The Applus+ Certification's verification 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 ^{/02/} for the 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 ^{/02/}, all direct employees of the 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 GS project activity has to fully respects the employees' rights (in accordance with all labour related laws endorsed in Brazil) as also appropriately outlined in the Transition Request Form + GS4GG PDD ^{/02/}. As also confirmed by the Applus+ Certification's verification 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 GS project activity and by the Ecoparque João Pessoa 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 verification team is able to confirm that the employment model applied by the project developer Orizon Valorização de Resíduos S.A. with employees or the 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

4. No child labour is allowed (Exceptions for children working on their families' property requires an <u>Expert Stakeholder</u> opinion)	GS project activity, Ecoparque João Pessoa Landfill and/or any other site or infrastructure operated by the company.
5. 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	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 GS project activity. As a conclusion, it is opinion of the Applus+ Certification's verification 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.

7. **STAKEHOLDER INPUTS AND LEGAL DISPUTES**

As confirmed by the Applus+ Certification's verification team, as part of continuous feedback process established by the project developer Orizon Valorização de Resíduos S.A., a grievance book is located at the main office of the Ecoparque João Pessoa landfill and it is monitored and addressed through the established grievance addressing procedures on a regular basis. By assessing such grievance book the Applus+ Certification's verification team confirmed that no comments/feedback were received from local stakeholders and that no legal disputes related to the project activity have arisen during the considered monitoring period

8. **VERIFICATION OPINION**

It is the opinion of Applus+ Certification's verification team that reported GHG emission reductions for the GS4GG project activity "Ecoparque João Pessoa Landfill Gas Project" for the monitoring period from 01/03/2023 to 26/11/2023 (both days included), as reported in the latest version of the Monitoring Report ^{/04/}, are calculated and reported without material misstatements and in a correct manner. Moreover, the Applus+ Certification's verification team has confirmed that all information presented in the latest version of the Monitoring Report ^{/04/} and all applied calculations for the determination of emission reductions achieved during the considered monitoring period are under full conformance with provisions and requirements of the Transition Request Form + GS4GG PDD (version 3.2) ^{/02/}, monitoring and baseline methodology ACM0001 – "Flaring or use of landfill gas" (Version 19.0.0) ^{/06/} and all applicable methodological tools ^{/10/ /11/ /12 /14/ /15/}. The adequacy and compliance of the monitoring plan in the Monitoring Report ^{/04/} was found as per the requirements established by the Transition Request Form + GS4GG PDD ^{/02/}.

The Applus+ Certification's verification team thus confirms the following regarding verified emission reductions:



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Project title	Ecoparque João Pessoa Landfill Gas Project
GS4GG ref no.	GS12045
Transition Request Form + GS4GG PDD	Version 3.2, dated 09/02/2024
Monitoring Report	Version 2. ~~23~~ , dated ~~031~~ / ~~107~~ /2024
Methodology used for verification:	ACM0001 (Version 19.0.0)
Applicable monitoring period:	01/03/2023 to 26/11/2023 (first and last day included)
Achieved emission reductions:	175, ~~479-629~~ tCO ₂ e

9. **CERTIFICATION STATEMENT**

LGAi Technological Center, S.A. ("Applus+ Certification") was engaged by the project developer and project owner Orizon Valorização de Resíduos S.A. to perform the 2nd periodical verification of the GS project activity (transitioned from the CDM to GS4GG) titled "Ecoparque João Pessoa Landfill Gas Project" for the monitoring period from 01/03/2023 to 26/11/2023.

The management of Orizon Valorização de Resíduos S.A. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity and the applied CDM methodology ACM0001 (Version 19.0) ^{/06/} + applicable CDM methodological tools.

The project activity is implemented and has operated at the Ecoparque João Pessoa landfill. In accordance with related project design information made available in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity, the operation of the project activity resulted in permanent and real mitigation of methane (CH₄) emissions during the considered monitoring period through collection and destruction of landfill gas (LFG) by combustion under controlled conditions in a high temperature enclosed flare and its utilization for electricity generation in the new electricity generation facility. While LFG is rich in CH₄, in the absence of the GS project activity (baseline scenario) it is assumed that the largest share of LFG collected and destroyed by the GS project activity would be directly emitted into the atmosphere. Moreover, the project also promoted emission reductions resulting from the displacement of an equivalent amount of electricity generated by the GS project activity which would otherwise be generated by existing grid-connected power plants, including fossil-fuel fired power plants (and addition of new power generation units) within the National Electricity Grid of Brazil).

As per the design of the GS project activity, the electricity demand of the GS 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. However, the installed backup off-grid generator (fueled by diesel) has not operated during the whole considered monitoring period.

LFG (which is rich in CH₄) has been historically generated at the Ecoparque João Pessoa Landfill as a result of the anaerobic decomposition of municipal solid waste (MSW) disposed in the site using appropriate MSW landfilling techniques and procedures.

The verification approach of Applus+ Certification was based on requirements/criteria as defined under the Kyoto Protocol ^{/07/}, Marrakesh accord ^{/08/}, as well as those defined by the CDM Executive Board and Gold Standard.

The approach by the Applus+ Certification's verification team is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is operated as planned and described in the Transition Request Form + GS4GG PDD ^{/02/} for the GS project activity;
- the monitoring plan is in accordance with the applied methodology;
- the monitoring activities presented in the Monitoring Report ^{/04/} are in accordance with the Transition Request Form + GS4GG and the monitoring plan approved by GS4GG;

- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In Applus+ verification team opinion, the GHG emission reductions for "Ecoparque João Pessoa Landfill Gas Project" for the monitoring period 01/03/2023 to 26/11/2023 (Both days included) as reported in Monitoring Report ^{/04/}, prepared on the basis of the project's Monitoring Plan are fairly stated.

Based on the information we have seen and evaluated, we confirm the following statement:
 Reporting period: 01/03/2023 to 26/11/2023 (Both days included) Verified emissions in the above reporting period:

Leakage emissions	0 tCO ₂ e equivalent
Project emissions	13 tCO ₂ e equivalent (rounded value)
Baseline emissions	175,492-642 tCO ₂ e equivalent (rounded value)
Emission reductions	175,479-629 tCO ₂ e equivalent

Date: 16/10/2024~~08/07/2024~~

Lead Auditor: Mr. Luis Filipe Tavares

Tech. Expert: Mr. Luis Filipe Tavares

Auditor: Mr. Srikanth Meesa

Auditor in Training:

Tech. Reviewer: Mr. Guilherme Horiuchi

Tech. Reviewer: Mr. Miguel Cortés

Mrs. Karen Vega Nonalaya

Approver (*Applus+ Certification VVB Technical Manager*)

Mr. Agustín Calle de Miguel

ASSESSMENT TEAM	
Lead Auditor: Mr. Luis Filipe Tavares	Technical Reviewer: Mr. Miguel Cortés
Signature:	Signature:
	Technical Reviewer: Mrs. Karen Vega Nonalaya
	Signature:
Approver: Mr. Agustín Calle de Miguel	
Signature:	

10. REFERENCES

LIST OF DOCUMENTS	
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/	Transition Request Form + GS4GG PDD for the GS project activity for the GS4GG Project activity: "Ecoparque João Pessoa Landfill Gas Project", Version 3.2, dated 09/02/2024
/03/	GS4GG GHG Emission Reduction & Sequestration Product Requirements (version 2.3). Available online: https://globalgoals.goldstandard.org/501-pr-ghg-emissions-reductions-sequestration/
/04/	Monitoring Report for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023 (version 1.0 dated 20/03/2024, version 2.0 dated 21/05/2024 and version 2.1 dated 18/06/2024, version 2.2 dated 03/07/2024, version 2.3 dated 01/10/2024).
/05/	Emission reduction calculation spreadsheets for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023 (version 1.0 dated 20/03/2024 and version 2.0 dated 21/05/2024), version 2.3 dated 01/10/2023 . Files name: "202303.xls" "202304.xls" "202305.xls" "202306.xls" "202307.xls" "202308.xls" "202309.xls" "202310.xls" "202311.xls"

	"MR2 GS - Ecoparque Candeias LFG Project - V.2.xls"
/06/	ACM0001 – "Flaring or use of landfill gas" (Version 19.0.0) Available online: https://cdm.unfccc.int/methodologies/DB/JPYB4DYQXQPZLBDVPHA87479EMY9M
/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: workbook; Available online: https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html 2006 IPCC Guidelines for National Greenhouse Gas Inventories: workbook. Available online: https://www.ipcc-nggip.iges.or.jp/public/2006gl/
/10/	CDM methodological Tool 06 "Project emissions from flaring" (version 04.0) Available online: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v1.pdf/history_view
/11/	CDM methodological Tool 05 "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-v3.0.pdf
/12/	CDM methodological Tool 04 "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

/13/	Input raw-data generated for checking emission reduction calculation spreadsheet for the GS4GG project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023. Files name: "202303-for checking.xls" "202304-for checking.xls" "202305-for checking.xls" "202306-for checking.xls" "202307-for checking.xls" "202308-for checking.xls" "202309-for checking.xls" "202310-for checking.xls" "202311-for checking.xls"
/14/	CDM methodological Tool 08 "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-v3.0.pdf
/15/	CDM methodological Tool 07 "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-v7.0.pdf
/16/	Câmara de Comercialização de Energia Elétrica (CCEE) (Electric Energy Trading Chamber) Monthly reports for consumption of grid-sourced electricity by the GS project activity for the periods from March/2023 to November/2023.
/17/	CDM Validation Report for the CDM Project Activity "PROBIOGAS-JP – João Pessoa Landfill Gas Project" (version 2.0, dated 05/12/2023) Available online: https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=3

/18/	Alta Geotecnia Ambiental Ltda. Evaluation/declaration reports for the monitoring parameter "Management of SWDS", issued in 18/04/2022, 07/03/2023 and 05/03/2024
/19/	Calibration certificate for the installed LFG flow meters: Certificate No. FMC4890/1021 for the Flow meter S/N 662115 issued by Flowmeter Calibração e Manutenção Ltda. on 07/10/2021. Certificate No. LMH1892/2023 for the Flow meter S/N 691387 issued by Hirsia Sistemas de Automação e Controle Ltda. on 10/02/2023. Certificate No. LMH 3210/2022_R1 for the Flow meter S/N 440371 issued by Hirsia Sistemas de Automação e Controle Ltda. on 25/03/2022. Certificate No. LMH 9640/2022 for the Flow meter S/N 691387 issued by Hirsia Sistemas de Automação e Controle Ltda. on 25/08/2022.
/20/	Calibration certificate for the installed continuous CH ₄ /O ₂ fraction gas analyzer unit: Certificate No. 2481/23 for the Gas analyzer unit S/N N1-M6-684 issued by Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda. on 23/08/2023. Certificate No. 2481/23 for the Gas analyzer unit S/N N1-M6-684 issued by Aselco Indústria, Comércio, Importação e Exportação de Instrumentação Ltda. on 23/08/2023.
/21/	Calibration certificate for the installed temperature meters: Certificate No. 0455/2022 for the Temperature meter S/N N2041.750002 issued by TQS Metrologia on 26/08/2022. Certificate No. 0979/2022 for the Temperature meter S/N N 2020.745989 issued by TQS Metrologia on 28/10/2022. Certificate No. 0557/2023 for the Temperature meter S/N N 2044.222597 issued by TQS Metrologia on 08/09/2023.
/22/	Technical specification sheet for the UV flame detector manufactured by Honeywell Kromschroder model UVS 6. Available online: https://www.nexinstrument.com/uvs-6
/23/	Calibration certificate for the installed pressure meters:

	Certificate No. 0433/2022 for the pressure meter S/N C4000005749787 issued by TQS Metrologia on 26/08/2022. Certificate No. 0080/2023 for the pressure meter S/N C4000005594893 issued by TQS Metrologia on 17/02/2023.
/24/	Calibration certificate issued by the company "3C Services S.A." for the electricity meter S/N MW1805A27402. Certificate No. CAL0062018. Calibration event date: 17/08/2018. Calibration certificates issued by the company "3C Services S.A." for the electricity meter S/N MW2105A81602. Certificate No. CAL0562021. Calibration event date: 24/08/2021.
/25/	Certificate No. 6947/22 for the thermocouple S/N N2148.256595 issued by Ecil Produtos e Sistemas de Medição e Controle Ltda. on 27/06/2022. Certificate No. T-0188/23 for the thermocouple S/N N2010.963442 issued by CTJ Metrologia Comércio e Serviços Ltda. on 02/02/2023.
/26/	CO₂ emission factor for electricity generation in Brazil National Interconnected System, annual values. Available online: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao
/27/	CDM PDD for the CDM Project activity: "PROBIOGAS-JP – João Pessoa Landfill Gas Project", valid for the 2nd crediting period under the CDM from 27/11/2015 to 26/11/2022, Version 8, dated 24/05/2019
/28/	CDM PDD for the CDM Project activity: "PROBIOGAS-JP – João Pessoa Landfill Gas Project", valid for the 3rd crediting period under the CDM from 27/11/2022 to 26/11/2029, Version 10.0, dated 10/03/2023
/29/	CDM Guideline "Guideline – Application of materiality in verifications", (version 02.0) Available online: https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150225171039008/iss_guid08.pdf
/30/	Internal service and maintenance logbooks (with details about historical of interventions, service and instrument/equipment calibration and replacement) for the GS project activity "Ecoparque João Pessoa Landfill has project" during the considered monitoring period.
/31/	GS4GG Monitoring Report Form (version 1.1) Available online:

	https://globalgoals.goldstandard.org/t-perfcert-monitoring-report/
/32/	GS4GG Audit techniques template Available online: https://globalgoals.goldstandard.org/t-vvb_audit-techniques/
/33/	Specification details for the flow meter unit manufactured by Fluid Components International, model ST51-1F11C0003. Available online: https://www.fluidcomponents.com/assets/media/Manuals-Guides/Flow-Meters/ST51-Series/ST51-Guide-(06EN003389-).pdf
/34/	Specification details for the flow meter unit manufactured by Fluid Components International, model ST51. Available online: https://www.fluidcomponents.com/Sales%20Brochures/Flowmeters/ST51-Data-Sheet-RevC.pdf
/35/	Technical specification sheet for the continuous CH₄ and O₂ fraction gas analyzer units Gas Analyzer Siemens AG - ULTRAMAT 23 Available online: https://www.siemens.com/global/en/products/automation/process-analytics/extraktive-continuous-process-gas-analytics/ultramat-23.html
/36/	Electric Energy Trading Chamber (in Portuguese language "Câmara de Comercialização de Energia Elétrica" - CCEE): Monthly reports dated: March 2023, April 2023, May 2023, June 2023, July 2023, August 2023, September 2023, October 2023 and November 2023.
/37/	Specification details for the temperature meter unit manufactured by Inor Process AB, model IPAQ-C202. Available online: https://www.krohne-inor.se/produkt/ipaq-c202/ Specification details for the temperature meter unit manufactured by Ecil Produtos e Sistemas de Medição e Controle de Temperatura, model PT-100.

	Available online: https://ecil.com.br/wp-content/uploads/2019/04/Pt-100.pdf
/38/	Specification details for the pressure meter manufactured by Honeywell Building Technologies, model ST700. Available online: https://process.honeywell.com/us/en/products/field-instruments/pressure-transmitters/smartline-st700-pressure-transmitters/flush-mount-pressure-transmitters-smartline-st700
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/41/	Input data for the emission reduction calculation spreadsheet for the GS4GG project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023. Files name: "202303-raw data.xls" "202304-raw data.xls" "202305-raw data.xls" "202306-raw data.xls" "202307-raw data.xls" "202308-raw data.xls"

	"202309-raw data.xls" "202310-raw data.xls" "202311-raw data.xls"
/42/	Comparative emission reduction calculation spreadsheet for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023. Created as part of the Data authenticity checking procedure performed during the remote inspection. Files name: "202303-comparative.xls" "202304-comparative.xls" "202305-comparative.xls" "202306-comparative.xls" "202307-comparative.xls" "202308-comparative.xls" "202309-comparative.xls" "202310-comparative.xls" "202311-comparative.xls"
/43/	Blank version of the emission reduction calculation spreadsheet applied for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" – monitoring period from 01/03/2023 to 26/11/2023. Files name: "202303-blank.xls" "202304-blank.xls" "202305-blank.xls" "202306-blank.xls" "202307-blank.xls" "202308-blank.xls" "202309-blank.xls" "202310-blank.xls" "202311-blank.xls"

/44/	EIA REPORT for the construction of the Ecoparque João Pessoa Landfill. Dated June 2002.
/45/	Monitoring Report for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" – 1 st monitoring period from 01/01/2021 to 28/02/2023 (version 2.2 dated 09/02/2024). GS Verification Report for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" for the 1 st monitoring period from 01/01/2021 to 28/02/2023 (version 3.0, dated 15/02/2024).
/46/	GS4GG Validation and Verification Standard (version 1.0) Available online: https://globalgoals.goldstandard.org/113-par-validation-and-verification-standard/
/47/	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/
/48/	List of all the employees from the project developer Orizon Valorização de Resíduos S.A. which are directly involved in the operation of the GS project activity during year 2023.
/49/	Orizon Valorização de Resíduos S.A.: Set of sequential live videos (movies) + photographs (pictures) of the GS project activity "Ecoparque João Pessoa Landfill Gas Project".
/50/	Specification sheet for the installed GE Jenbacher engine-generator set model J420.
/51/	Declaration from the manufacturer of flare 1 "Biotecnogas s.r.l." indicating the operational ranges for LFG flow sent to the flares and temperature of the exhaust gases in order to ensure high efficiency combustion of LFG.
/52/	Orizon Valorização de Resíduos S.A.: "Relatório anual de Sustentabilidade" (Annual Sustainability Report) year 2022 Available online: https://ri.orizonvr.com.br/sustentabilidade/relatorio-anual-de-sustentabilidade/
/53/	Annual Report for the GS project activity "Ecoparque João Pessoa Landfill Gas Project" (valid for the year of 2023 (dated 18/06/2024).
/54/	GS4GG project search page of the GS4GG project activity "Ecoparque João Pessoa Landfill Gas Project"

	Available online: https://registry.goldstandard.org/projects/details/4047
/55/	SDG Impact Tool for the GS project activity "Ecoparque João Pessoa Landfill Gas Project".
/56/	CDM Validation and Verification Standard for project activities (CDM-VVS-PA) (version 03.0), dated 09/09/2021. Available online: https://cdm.unfccc.int/Reference/Standards/index.html
/57/	Medical Control Program of Occupational Health valid for the JP landfill (including the project activity). Annual Reports valid for the year 2023.
/58/	Risk Management Program valid for the JP landfill (including the project activity). Annual Reports valid for the year 2023.
/59/	Employees Time Report with records of the time each employee arrives at and leaves the landfill. Monthly records valid for the year 2023.
/60/	Monthly Payment Reports with details of extra hours, additional nightly payments, remunerated vacations and health and safety related payments provided to employees of the project activity. Monthly Reports valid for the year 2023.
/61/	Declaration statement issued by a third-party specialist (Mr. José Carlos W. Fagundes, labor lawyer) confirming that labor policies established by the project developer Orizon Valorização de Resíduos S.A. are under conformance with related national labor laws.
/62/	GS4GG Site Visit and Remote Audit Requirements and Procedures (version 2.0) Available online: https://globalgoals.goldstandard.org/112_par_site-visit-and-remote-audit-requirements-and-procedures/ GS4GG Rule Update - Applicability of Minimum Site Visit Requirements by VVB Available online: https://globalgoals.goldstandard.org/standards/RU_2021_Applicability-of-minimum-site-visit-requirements-by-VVB.pdf
/63/	CDM project search page of the CDM project activity "PROBIOGAS-JP – João Pessoa Landfill Gas Project" Available online: https://cdm.unfccc.int/Projects/DB/SGS-UKL1181685608.94/view?cp=1



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/64/	GS4GG Validation Report of transition from the CDM to the GS4GG for the GS Project Activity "Ecoparque João Pessoa Landfill Gas Project" (version 2.0, dated 14/02/2024) Available online: https://registry.goldstandard.org/projects/details/4047
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Appendix 1: Corrective Action Requests / Clarification Request / Forward Action Request resolution table

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	1	Date: 14/05/2024
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: 21/05/2024
As a response to the raised FAR, a declaration was included in the Monitoring Report which confirms that the project will not issue both CERs/other compliance units under the Paris Agreement and a GSVER for the same vintage (for the considered and also for future monitoring periods within the GS4GG).		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
The Applus+ Certification's verification team confirmed that the response provided by the project developer and the inclusion of a declaration in the Monitoring Report sufficiently address the raised FAR. This FAR is thus closed.		

Table 2. Remaining FAR from validation and/or previous verifications

FAR ID	2	Date: 14/05/2024
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: 21/05/2024
-		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
Although the start date of the crediting period for the project activity under the GS4GG was defined as 01/01/2021, the decision to transition the project activity from the CDM to the GS4GG was only made during the year of 2022, and the agreement with Applus+ Certification to perform the joint Validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1 st monitoring period of the project activity under the GS4GG) was only made on 14/04/2023. Nonetheless, a site visit was recently performed by the Applus+ Certification's team which was designated to perform the joint validation assessment (for the transition from the CDM to the GS4GG) and verification assessment (for the 1 st monitoring period of the project activity under the GS4GG) on 18/05/2023. The quoted requirements are thus considered as sufficiently met, with no site visit being required in the context of the considered monitoring period.		

Table 3. Remaining FAR from validation and/or previous verifications

FAR ID	3	Date: 14/05/2024
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:
-		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
As confirmed by Applus+ Certification's verification team, the GS4GG project activity was only registered under the GS4GG on 12/03/2024 (date of Design Review approval). Thus, an initial Annual Report for the GS project activity (valid for the year of 2023) (which was assessed by the Applus+ Certification's verification team) will be submitted along with the Monitoring Report. Moreover, while the first Performance Review was performed by Applus+ Certification jointly with the Validation assessment (for the transition from the CDM to the GS4GG), the related quoted requirement is thus also considered as sufficiently met		

Table 4. CAR from this verification

CAR ID	1	Date: 14/05/2024
Description of CAR		
Section B.1.1. of the Monitoring Report wrongly indicates that FAR 02 and FAR 03 raised during the GS4GG validation assessment for the transition of the project activity from the UNFCCC's Clean Development Mechanism (CDM) to Gold Standard for Global Goals (GS4GG) should only be addressed in future verifications.		
Project developer response		Date: 21/05/2024
As a response to the raised CAR, information regarding FAR 02 and FAR 03 was corrected in Section B.1.1. of the revised version of the Monitoring Report.		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.		

Table 5. CAR from this verification

CAR ID	2	Date: 14/05/2024
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Description of CAR	
The technical evaluations performed by specialized 3 rd -party company which are used as part of the monitoring for the parameter "Management of SWDS", as presented in Section D.2. of the Monitoring Report, do not cover the entire considered monitoring period.	
Project developer response	Date: 21/05/2024
As a response to the raised CAR, information regarding the monitoring parameter "Management of SWDS" was corrected in Section D.2. of the revised version of the Monitoring Report.	
Documentation provided by project developer	
-	
DOE assessment	Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.	

Table 6. CAR from this verification

CAR ID	3	Date: 14/05/2024
Description of CAR		
While a relative delay in performing the calibration event for the installed gas analyzer unit has occurred, the Monitoring Report does not present any information about such occurred delay nor its impact over the determination of emission reductions.		
Project developer response		Date: 21/05/2024
As a response to the raised CAR, information regarding the identified delay in the installed gas analyzer unit component was added in the revised version of the Monitoring Report.		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.		

Table 7. CAR from this verification

CAR ID	4	Date: 14/05/2024
Description of CAR		
The list of maintenance events performed in the installed high temperature enclosed flare (in the context of monitoring the parameter "Maintenance _y ") should include additional event(s) prior to the maintenance event of 01/03/2024 (event(s) occurred within the considered monitoring period).		
Project developer response		Date: 21/05/2024
As a response to the raised CAR, information about maintenance events performed in the installed high temperature enclosed flare during the monitoring parameter Maintenance _y was included in the revised version of the Monitoring Report.		

Documentation provided by project developer	
-	
DOE assessment	Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.	

Table 8. CAR from this verification

CAR ID	5	Date: 09/05/2024
Description of CAR		
Section B.1. of the Monitoring Report does not include details about relevant operational events occurred during the considered monitoring period which caused significant impact over the calculation of emission reductions.		
Project developer response		Date: 21/05/2024
As a response to the raised CAR, information regarding relevant operational events occurred during the considered monitoring period was included in the revised version of the Monitoring Report.		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.		

Table 9. CAR from this verification

CAR ID	6	Date: 14/05/2024
Description of CAR		
The summarized emission reductions calculation spreadsheet does not report the sustainable development contributions achieved during the considered monitoring period related to SDG 7 and SDG 8.		
Project developer response		Date: 21/05/2024
As a response to the raised CAR, information regarding SDGs 7 and 8 were added in the revised version of the ER spreadsheet.		
Documentation provided by project developer		
-		
DOE assessment		Date: 31/05/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the emission reductions calculation spreadsheet sufficiently address the raised CAR. This CAR is thus closed.		

Table 10. CAR from this verification

CAR ID	7	Date: 17/06/2024
Description of CAR		
Section C of the Monitoring Report does include sufficient details about the adopted management system of the project activity.		
Project developer response		Date: 18/06/2024
As a response to the raised CAR, Section C of the Monitoring Report was revised by including further details about the adopted data acquisition, storage and management system and also details about managerial responsibilities of the project activity.		
Documentation provided by project developer		
-		
DOE assessment		Date: 19/06/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.		

Table 11. CAR from this verification

CAR ID	8	Date: 17/06/2024
Description of CAR		
Details presented in the Monitoring Report about the flow meters utilized during the considered monitoring period for measuring flow of LFG sent to the flare and to the engine-generator sets are not in accordance with provided documented evidence.		
Project developer response		Date: 18/06/2024
As a response to the raised CAR, information details about the flow meters utilized during the considered monitoring period for measuring flow of LFG sent to the flare and to the engine-generator sets were corrected in the revised version of the Monitoring Report.		
Documentation provided by project developer		
-		
DOE assessment		Date: 19/06/2024
The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.		

Table 12. CAR from this verification

CAR ID	9	Date: 24/06/2024
Description of CAR		
Details presented in the Monitoring Report about the flow meters utilized during the considered monitoring period for measuring flow of LFG sent to the flare and to the engine-generator sets are not in accordance with provided documented evidence.		
Project developer response		Date: 03/07/2024

As a response to the raised CAR, information details about the flow meters utilized during the considered monitoring period for measuring flow of LFG sent to the flare and to the engine-generator sets were corrected in the revised version of the Monitoring Report.

Documentation provided by project developer

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DOE assessment

Date: 08/07/2024

The Applus+ Certification's verification team confirmed that related corrections made in the revised version of the Monitoring Report sufficiently address the raised CAR. This CAR is thus closed.

FAR raised by the SustainCERT as part of the 1st round of Comments of the Performance Review:

Description of FAR

VVB shall check CDM registry or any other carbon registry, those could hold carbon credits and Transition to Article 6.4 database to confirm that there is no double counting of carbon credits issued for the project.

DOE assessment

Date: 08/07/2024

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Con formato: Fuente: 10 pto, Sin subrayado

Con formato: Justificado

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The following assessment is included in Section 5.1:

"Applus+ Certification checked the registry/database for Program of Renewable Energy Certificates (RECs) in Brazil (I-REC Brazil and confirmed that the GS project activity is not accredited / registered under I-REC Brazil program (<https://site.institutototum.com.br/>). The Applus+ Certification's verification team also checked publicly information and registration details valid for the REC/VER registries/programs below and also confirmed that the 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/>)*

Regarding Article 6.4, the Applus+ Certification's verification team has confirmed that the project activity has indeed requested the transition to Article 6.4 (through assessment of the list "CDM activities that are eligible and have requested transition to the A6.4 Mechanism", available online at <https://unepccc.org/cdm-ji-pipeline/>). The Applus+ Certification's verification team has also assessed the content of an email communication submitted to representatives of the Article 6.4 mechanism on 16/10/2024 (sent to the official email address "A6.4mechanism-info@unfccc.int" (that is confirmed as representing the official channel of communications to A 6.4 Supervisory Board) informing that no GHG emission reductions are to be issued under the Article 6.4 mechanism for the whole period from 01/01/2021 to 26/11/2023 by the project activity since GS VERs were already issued (and are yet to be issued) for this period encompassing the monitoring periods for the project activity under GS4GG. As also confirmed by the Applus+ Certification's verification team through assessment of related control document, a deemed robust and reliable internal routine/procedure to ensure that, under no circumstance, double counting of GHG emission reductions occurs for the particular case of the project activity is implemented at Orizon Valorização de Resíduos S.A.

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Appendix 2: Verification Team CVs

Name	Short CV. Background Information
Mr. Luis Filipe Tavares	Luis Filipe Aboim Tavares holds a Bachelor's Degree in Metallurgical Engineering and has twenty tree years' experience in steel production industry covering utilities (water, steam, and wastewater treatment) and environment control (air emissions, wastewater and solid waste management). He has acted as a GHG auditor since year 2002. He holds vast experience with 3rd party independent assessments of GHG emission reduction project activities within the area of renewable energy, solid waste management and wastewater treatment implemented in Latin America and other regions. He has experience in validation and verification of numerous CDM projects in Latin America. His technical qualification and experience under the CDM include sectors/industries such as iron and steel; metal production; oil and gas industry, electricity and steam generation from renewable energy sources; solid waste handling and disposal as well as animal waste management. He has undergone extensive training for the performance of GHG validation and verification assessments and he is currently qualified expert for Sectoral Scope 13 under Technical Area "Waste management" and Sectoral Scope 1, among others in accordance with procedures of Applus+ Certification. He also has years-long previous experience on conducting ISO 9001/14001 assessments. Mr. Luis Filipe Aboim Tavares is based in Rio de Janeiro, Brazil.
Mr. Srikanth Meesa	Srikanth Meesa is CEO of Global Green Solutionz. He comes with more than 17 years of experience in the areas of GHG assessments (carbon credits related certification), carbon footprint studies, water audits, Environment Management, Corporate Sustainability Management & Reporting, Legal Compliance, Policy and Strategy Formulation, green technologies for wastewater treatment, waste management and roof top solar project, climate change sector, Life Cycle Assessment, BRSR reporting and development of Carbon projects. He is also a certified energy auditor from Bureau of Energy Efficiency and undergone ISO 14064 lead auditor certification. He also provides training programs on various carbon mechanisms and ISO 14064. He has also reviewed carbon and sustainability management data for Aditya Birla group through LRQA. He is selected as roster of experts for VERRA and GCC. In addition to the carbon assessments, he also conducts technical review of the carbon projects for Applus and TUV SUD. He is appointed as external verifier by LR to perform the assessments of vessel emissions under EU MRV and UK MRV mechanisms. He completed B. E in Civil Engineering from Osmania University and M. Tech in Environmental Engineering & management from IIT Delhi. He did a three-month intensive online course from World Bank Institute on Competiveness and Corporate Social Responsibility. Recently, he has completed an e- course on Sustainable Finance from IIMA.
Mr. Guilherme Horiuchi	Guilherme Horiuchi has bachelor's degree in environmental engineering. Mr. Horiuchi has worked as a GHG auditor since 2011 with CDM/GS4GG/GS project assessments in Latin America before he joined Applus+. While counting with relevant previous experience/expertise as a trainee auditor with an U.N. accredited Certification Body and with proven experience and knowledge in both validation and verification assessments of GHG abatement/mitigation project-based initiatives under the U.N. Clean Development Mechanism (CDM) and Voluntary Carbon Standard (VCS), Mr. Horiuchi has supported the assessment/analysis of PDDs/PDs, Monitoring Reports, GHG emission reduction calculation spreadsheets, investment analysis spreadsheet for multiples project-based initiatives (under the CDM and VCS)

	promoting GHG abatement/mitigation through collection and destruction/utilization of landfill gas (LFG) located in Brazil, Chile and Colombia. He is certified by SustainCERT Academy under the following scopes: "GS4GG", "Energy and Waste" and also "Land use and Forest". Moreover, he has also experience in conducting GHG Inventories for corporate and industry entities under the ISO 14064. Guilherme Horiuchi is based in Curitiba, Brazil.
Mr. Migue Cortés	Mr. Miguel Cortés holds a Bachelor's Science Degree on Civil and Environmental Engineering, being specialized on Hydric Resources. He has worked as CDM/VCS/GS and environmental consultant for different industries of multidisciplinary sectors world widely. Mr. Miguel Cortés counts with several years of GHG assessment experience, working and being qualified as Lead Auditor and Technical Reviewer for different DOEs world widely, as well as has been part of Gold Standard expert's committees and has been approved as a member of the UNFCCC RIT in 2019. Furthermore, he has performed his professional GHG assessment portfolio career worldwide and focusing in Latin America, developing assessments for projects in Argentina, Mexico, Panama, Colombia and Chile, among others. Mr. Miguel Cortés is based in Bogota, Colombia.
Mrs. Karen Vega Nonalaya	Ms. Karen Vega has a Bachelor's Degree in Environmental Sciences from the University of Barcelona, she has post-graduate studies in renewable energies, and a master's degree in finances. Karen has more than 7 years of professional experience in the sector of quality, environment, and climate change. Her professional career has been mainly focused, but not limited to, on the sector of validation and verification of GHG emission compensation and mitigation projects, in different countries and under universally recognized standards (CDM-UNFCCC, VS, GS4GG, GCC). She has also worked as Sustainability and Environment consultant mainly for the metal coating sector, conducting transversal roles and opening successfully the sustainability department in the company. Currently, she works in Applus + Certification Project Manager, being especially involved in technical and management tasks in the DOE/VVB to ensure the quality of the performance of different assessments, coordinate the global team, and maintenance of the Accreditations. Karen has attended different CDM, VCS, GS4GG, GCC, ISO 9001, and ISO 14001 training processes. She has conducted consultancy services for ISO 9001 and ISO 14001 implantation in various companies, being in charge from its beginnings until final certification and certificate obtain; in the same way she has conducted Carbon Footprint Analysis and Reports. Holds experience as Verifier for GHG mitigation projects and programmes of activities in Sectoral Scope 1.1 (Thermal energy generation) and 1.2 (Renewables), qualified as per Applus+' procedures. She is already qualified as an auditor for ISO 9001, ISO 14001, GHG audits, Carbon footprint Audits and CDM renewable projects audits (Sectoral Scopes 1.1 and 1.2). Ms. Karen Vega is based in Barcelona, Spain.