

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

RELATED SUPPORT - **TEMPLATE GUIDE Monitoring Report v. 1.2**

This document contains the following Sections

Key Project Information

Section A - Description of project

Section B - Implementation of project

Section C - Description of monitoring system applied by the project

Section D - Data and parameters

Section E - Calculation of SDG Impacts

Section F - Safeguards Reporting

Section G - Stakeholder inputs and legal disputes

KEY PROJECT INFORMATION

Key Project Information

GS ID (s) of Project (s)	GS12047
Title of the project (s) covered by monitoring report	Ecoparque Candeias Landfill Gas Project
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	7.1
Version number of the monitoring report	2.0
Completion date of the monitoring report	25/11/2025
Date of project design certification	15/10/2023
Date of Last Annual Report	16/12/2025
Monitoring period number	3 rd monitoring period under the GS4GG
Duration of this monitoring period	From 29/09/2023 to 31/08/2025 (both days included)
Project Representative	Orizon Valorização de Resíduos S.A. ¹ Mr. Dalton Canelhas
Host Country	Brazil
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	ACM0001: "Flaring or use of landfill gas" (version 19.0)

¹ While the GS project activity was previously implemented by the company Haztec Tecnologia e Planejamento Ambiental S.A., this company was merged with the company Orizon Valorização de Resíduos S.A. in year 2020, Orizon Valorização de Resíduos S.A. represents the current owner and operator of the GS project activity.

Product Requirements applied

- ☒ GHG Emissions Reduction & Sequestration
☐ Renewable Energy Label
☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
7 - Affordable and Clean Energy	Total electricity produced: Renewable	307,666	MWh
8 - Decent work and Economic Growth	Total number of jobs	20 ²	Jobs
13 - Climate Action	Amount of GHGs emissions avoided or sequestered	1,341,274	tCO ₂ e

Table 2 – Product Vintages

		Amount Achieved
Start Dates	End Dates	VERs
01/03/2023	28/09/2023	466,834 tCO ₂ e
29/09/2023	31/12/2023	198,115 tCO ₂ e
01/01/2024	31/12/2024	748,078 tCO ₂ e
01/01/2025	31/08/2025	395,081 tCO ₂ e

² Average of employees directly involved in the operation of the GS project activity during the considered monitoring period.

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

>>

The Gold Standard (GS) project activity “Ecoparque Candeias Landfill Gas Project” (hereafter referred to as the “GS project activity”) encompasses collection of landfill gas (LFG) (generated from anaerobic decomposition of Municipal Solid Waste (MSW) historically disposed at the Ecoparque Candeias landfill) and its destruction through flaring and/or its utilization as gaseous fuel for electricity generation.

The Ecoparque Candeias landfill is located in the municipality of Jaboatão dos Guararapes, Pernambuco state, Brazil. The landfill site currently encompasses an MSW disposal surface of about 170,000 m². The Ecoparque Candeias landfill started its Municipal Solid Waste (MSW) permanent disposal activities in the year 2007. The landfill has received all required and applicable environmental licenses/permits for its operation. The landfill currently receives about 3,300 tons of MSW per day.

By the end of the considered monitoring period, the GS project activity encompassed the following operational components/infrastructure:

- (i) Collection of LFG through a set of vertical LFG collecting wells that are interconnected through an LFG collection pipeline network.
- (ii) Destruction of all collected LFG by combustion (in a high temperature enclosed flare installed as part of the project’s LFG destruction/flaring infrastructure).
- (iii) Utilization of LFG as gaseous fuel for electricity generation in the currently installed 20 engine-generator sets fueled uniquely by LFG.

Under conformance with the project’s monitoring system in place, the amount and quality of collected LFG which was sent to the flare and to the engine-generator sets during the considered monitoring period was continuously measured, recorded and reported. During the monitoring period, monitoring activities for the GS project activity encompassed continuous measurements of (i) flow of LFG sent to the installed high temperature enclosed flare, (ii) flow of LFG sent to the installed engine-generator sets, (iii) CH₄ content/fraction of collected LFG, (iv) LFG temperature, (v) LFG pressure, etc.

As also established in the project's monitoring procedure, the operational status/condition for the high temperature enclosed flare and the engine-generator sets are also monitored on an individual basis.

The baseline scenario in terms of LFG management at the Ecoparque Candeias landfill is the same as the scenario existing prior to the implementation of the GS project activity:

- Largest share of LFG generated at the Ecoparque Candeias landfill (with high content of methane) being directly emitted into the atmosphere through the surface of the landfill and through pre-project conventional LFG venting/combustion drains, with a minor share of generated LFG being collected and combusted in the pre-project venting/combustion drains (under non-efficient and non-continuous basis), with no active (forced) system to collect LFG nor any systematic and monitored flaring system implemented.
- No utilization of LFG as gaseous fuel for electricity generation, with electricity (under an equivalent amount of electricity generated by the GS project activity) being generated in existing electricity generation sources connected to the National Electricity Grid of Brazil (including fossil fuel fired power plants) and addition of new electricity generation sources within such electricity grid.

It is relevant to note that, prior to being successfully migrated to GS4GG in year 2024, the GS project activity was previously registered, gradually/phased implemented and it operated as a project-based initiative under the UNFCCC's Clean Development Mechanism (CDM) and has successfully issued 1,345,179 CDM Certified Emission Reductions (CDM CERs) along a set of chosen monitoring periods from year 2011 to year 2020.

There is no double counting between the current registry under the GS4GG and under the CDM for the same time period. Moreover, as seen in Appendix 1 the Project developer confirms that the GS Project activity will not issue both certified emission reductions (CERs) under the CDM (and/or other compliance unit under the Paris Agreement) jointly with GS VERs for the same vintage (for the considered and also for future monitoring periods under the GS4GG).

Contributions of the GS project activity towards Sustainable Development:

While methane is a powerful greenhouse gas (GHG), the pre-project situation representing direct emission of LFG into the atmosphere contributes to climate change. Collection and destruction/utilization of LFG as a result of the implementation and operation of project activity have promoted real, permanent and measurable abatement of methane emissions at the Ecoparque Candeias landfill. The GS project activity has promoted GHG emission reductions of 1,341,274 tCO₂e during the monitoring period from 29/09/2023 to 31/08/2025. Furthermore, by promoting electricity generation through the utilization of LFG as a renewable energy source, the GS project activity has also promotes displacement of electricity that would be otherwise generated by existent grid-connected electricity generation sources (including fossil fuel fired power generation sources) and addition of new grid-connected power generation sources along the baseline scenario, thus promoting permanent and real CO₂ emission reductions associated with electricity generation.

Besides climate change mitigation, the GS project activity provides other important local environmental benefits: LFG contains trace amounts of volatile organic compounds, which are regarded as local air pollutants. Capturing of LFG using an active forced collection system and its combustion thus also promotes reduction of emission of local pollutants.

Capacity building and job creation by the GS project activity:

As part of the GS project activity, the project developer has invested in training activities to get properly skilled staff (engineers, technicians, operators, etc.) able to conduct the implementation and management of the GS project activity.

Electricity generation from renewable energy source:

Electricity generated by the GS project activity has contributed towards to the country efforts to increase the participation of renewable energy in the Brazilian energy generation profile.

A.2. Location of project

>>

The Ecoparque Candeias landfill and the GS project activity are located in Pernambuco State, in the municipality of Jaboatão dos Guararapes within the Recife Metropolitan Area, under the following geographical coordinates:

- Latitude: 8°09'51.3"S (-8.164258)
- Longitude: 34°59'07.0"W (-34.985286.)



Figure 1 - Location of the Ecoparque Candeias Landfill Gas Project within Brazil

Source: Google Earth application (2024)



Figure 2 - Location of the Ecoparque Candeias Landfill Gas Project within the state of Pernambuco

Source: Google Earth application (2024)

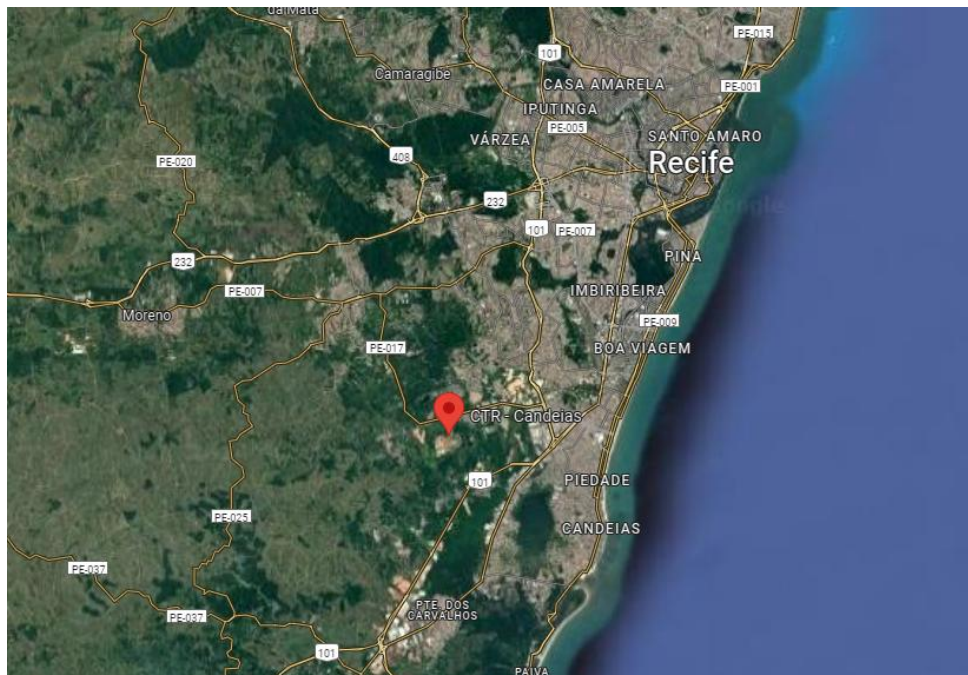


Figure 3 - Location of the Ecoparque Candeias Landfill Gas Project within the city of Jaboatão dos Guararapes

Source: Google application (2024)



Figure 4 – Panoramic view of the Ecoparque Candeias Landfill Gas Project

A.3. Reference of applied methodology

>>

The GS project activity applies the following CDM baseline and monitoring within its initial GS crediting period (which encompasses the considered monitoring period):

- Consolidated baseline and monitoring CDM methodology ACM0001 - "Flaring or use of landfill gas" (version 19.0)
(<https://cdm.unfccc.int/methodologies/DB/JPYB4DYQUXQPZLBDVPHA87479EMY9M>)

The following methodological tools are also applied:

- TOOL 02: Combined tool to identify the baseline scenario and demonstrate additionality (version 7.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf/history_view)
- TOOL 03: Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 03.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view)

- TOOL 04: Emissions from solid waste disposal sites (version 08.1)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.1.pdf/history_view)
- TOOL 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view)
- TOOL 06: Project emissions from flaring (version 04.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v4.0.pdf/history_view)
- TOOL 07: Tool to calculate the emission factor for an electricity system (version 07.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view)
- TOOL 08: Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v1.pdf/history_view)
- TOOL 09: Determining the baseline efficiency of thermal or electric energy generation systems (version 03.0)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v3.0.pdf/history_view)
- TOOL 11: Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period (version 03.0.1)
(https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v1.pdf/history_view)

A.4. Crediting period of project

>>

The 2 crediting periods for the project activity under the CDM were previously defined as follows:

1st CP: from 29/09/2011 to 28/09/2018

2nd CP: from 29/09/2018 to 28/09/2025

Under the GS4GG, the GS project activity will have the following crediting periods³:

2nd CP: from 01/01/2021 to 28/09/2023

3rd CP: from 29/09/2023 to 28/09/2026

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

>>

The Ecoparque Candeias landfill is regarded as a very well-designed and well-managed landfill site. It currently applies the best practice available in Brazil in terms of MSW landfilling from both design and operation perspectives. As established by the valid environmental and operational permits, all MSW disposed at the Ecoparque Candeias landfill is covered and levelled with the use of heavy equipment (excavators, compacting equipment, etc.). Furthermore, safety requirements are defined and addressed as part of the operation of the landfill by using a preventative approach.

The Ecoparque Candeias landfill started receiving MSW in year 2007 and it currently covers a MSW disposal area of about 170,000 m². The landfill was granted with all required environmental licenses/permits for its continuous operation since the beginning of its operations.

³ As further detailed in a response to a comment raised by the SustainCERT under the 2nd round of Design Review for the transition of the project activity from the CDM to the GS4GG (comment 11), the crediting periods for the project activity under the GS4GG were defined as the periods above by taking into account that, as per GS4GG rules, the project activity transitioned from the CDM into GS4GG can only issue GS VERs for a maximum period of 15 years, the end date for its last crediting period under GS4GG is therefore defined as 28/09/2026 (thus completing 15 years after the project's start date and the start date of its initial 7-year crediting period under the CDM (29/09/2011)). Moreover, while CDM CERs were previously issued for the project activity up to 31/12/2020, no GS VERs are to be issued for the period prior to 01/01/2021.

As per the project design, LFG collected at the Ecoparque Candeias landfill is to be utilized as gaseous fuel for electricity generation or flared. Employed technology encompasses the design, construction and operation of an appropriate LFG destruction infrastructure (flaring of LFG in a high temperature enclosed flare) and infrastructure for utilization of collected LFG as gaseous fuel for electricity generation in an electricity generation infrastructure also installed within the geographical limits of the Ecoparque Candeias landfill. Collection of LFG occurs through an active LFG collection system composed by appropriate LFG vertical collection wells, LFG transportation pipeline network with methane destruction and utilization occurring through combustion of collected LFG in a high temperature enclosed flare and engines of the project's electricity generation infrastructure, respectively.

During the considered monitoring period, the electricity demand of the GS project activity was alternately met by electricity generated by project's electricity generation infrastructure and/or by imports of grid-sourced electricity. The installed backup captive off-grid electricity generator (fueled by diesel) did not operate during the considered monitoring period.

During the considered monitoring period, the design configuration of the GS project activity encompassed the following infrastructure:

LFG collection and moisture removal infrastructure:

The GS project activity includes infrastructure for collecting LFG encompassing the following main components:

- Set of vertical LFG collection wells installed across the MSW disposal area of the Ecoparque Candeias landfill with optimized well spacing for allowing high LFG collection rate.
- Condensate (liquids) extraction systems (strategically positioned at low level points within the project's LFG collection pipeline network).
- Moisture traps to remove moisture and other impurities from collected LFG.
- A centrifugal blower system used to cause negative pressure in the pipeline (before the blowers) and positive pressure (after the blowers) in order to direct collected LFG to the project's LFG destruction/utilization devices (high temperature enclosed flare and engine-generator sets).

LFG flaring infrastructure:

The GS project activity encompasses the following characteristics to promote efficient and controlled combustion of collected LFG through flaring:

- Safe and low emission combustion of LFG guaranteed by the utilization of high temperature enclosed flare that allows safe, controlled and efficient combustion of LFG.
- Use of best practice safety devices for the flare (such as flame detector and slam shut valve).
- Continuous measurement of temperature of the exhaust gas of the flare (with continuous monitoring of the flare status. While the applied CDM baseline and monitoring methodology ACM0001 (version 19.0) and applicable methodological tools require ex-post monitoring on whether flaring equipment combusting LFG operates under compliance with operational requirements and recommendations of the equipment manufacturer, the main operational characteristics and specifications of the high temperature enclosed flare currently installed as part of the GS project activity are defined as follows:

Characteristics/specifications of the installed flare
Manufacturer: Biotechnogás (BTG) Min. LFG flaring capacity (for continuous operation): flow rate of 500 Nm³/h Max. LFG flaring capacity (for continuous operation): flow rate of 2,500 Nm³/h Required min. temperature of the exhaust gas of the flare (to ensure LFG destruction under high CH₄ destruction efficiency): 850 °C Required max. temperature of the exhaust gas of the flare (to ensure LFG destruction under high CH₄ destruction efficiency): 1,200 °C

Source: Equipment technical declarations made available by the equipment supplier/manufacturer Biotechnogás (BTG)

Electricity generation infrastructure:

As part of the GS project activity, methane has been destroyed through combustion of collected LFG in a set of up to 20 engine-generators fully powered by LFG which represent the major components of the project's electricity generation infrastructure. The installed engine-generator sets are manufactured by GE Jenbacher GmbH & Co OHG and have individual nameplate power generation capacity of about 1.42 MW each.

Details about monitoring instruments/equipment utilized within the considered monitoring period are described in Section C.

During the considered monitoring period, the GS project activity faced events when it became temporarily out of operation due to different reasons (occurred temporarily interruption of supply of collected LFG to the flare and/or engine-generator sets, temporarily interruption in the supply of grid-sourced electricity to the GS project activity, occurrence of previously planned or unplanned equipment maintenance/repair events, performance of calibration events, drainage of excess of condensate material from the project's LFG pipeline, identification of unexpected problems in the project's Programming Logic Controller (PLC) panel, data communication problems, etc.).

It is important to note that a new infrastructure to promote upgrade of LFG and supply/export of upgraded LFG (biomethane) was implemented and initiated its commissioning phase (on March/2025). However, such LFG utilization infrastructure will be separate from the project activity and will thus not be included as part of the GS project activity. Methane destroyed in the new LFG upgrade infrastructure during the monitoring period is thus not being considered for the determination of emission reductions achieved by the GS project activity.

Moreover, it is also relevant to note that, while a new power substation is being implemented in order to meet the electricity demand of the new LFG upgrade infrastructure through an exclusive electricity line, such power substation was not yet implemented during the considered monitoring period. Thus, the electricity demand of the new LFG upgrade infrastructure was met by electricity generated by the project activity and/or through electricity imported from the same transmission line to which the project activity is connected to.

B.1.1 Forward Action Requests

>>

There is one FAR to be addressed in the context of the 3rd monitoring period under the GS4GG as follows:

"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”.

Consideration/addressing of the raised FAR:

A declaration confirming that the GS project activity will not jointly claim/issue CDM CERs (and/or other compliance GHG emission reduction units under the Paris Agreement) and GS VER for the same vintage (for the considered monitoring period and also for future monitoring periods under GS4GG) is included in Appendix 1 of the Monitoring Report.

FARs from validation or previous monitoring periods which are not applicable to the current monitoring period are inserted in Appendix 2.

B.2. Post-Design Certification changes

>>

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

>>

There are no temporary deviations from the Monitoring & Reporting Plan, applied CDM baseline and monitoring methodology and/or other methodological regulatory documents occurred as part of the operation of the GS project activity during the considered monitoring period. Moreover, no temporary deviations were previously addressed for the GS project activity during its previous monitoring periods under the CDM.

B.2.2. Corrections

>>

There are no corrections that occurred as part of the operation of the GS project activity during the considered monitoring period.

B.2.3. Changes to start date of crediting period

>>

There are no changes to the start date of the crediting period encompassed by the considered monitoring period. Moreover, no request to change the start date for the crediting period of the GS project activity was ever addressed under the CDM.

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

>>

There are no permanent changes from the monitoring plan, and the CDM baseline and monitoring methodology encompassed by the considered monitoring period.

B.2.5. Changes to project design of approved project

>>

There are no changes to the project design of approved project encompassed by the considered monitoring period.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

>>

The process diagram for the project infrastructure available and under operation during the considered monitoring period is summarized in the schematic diagram below:

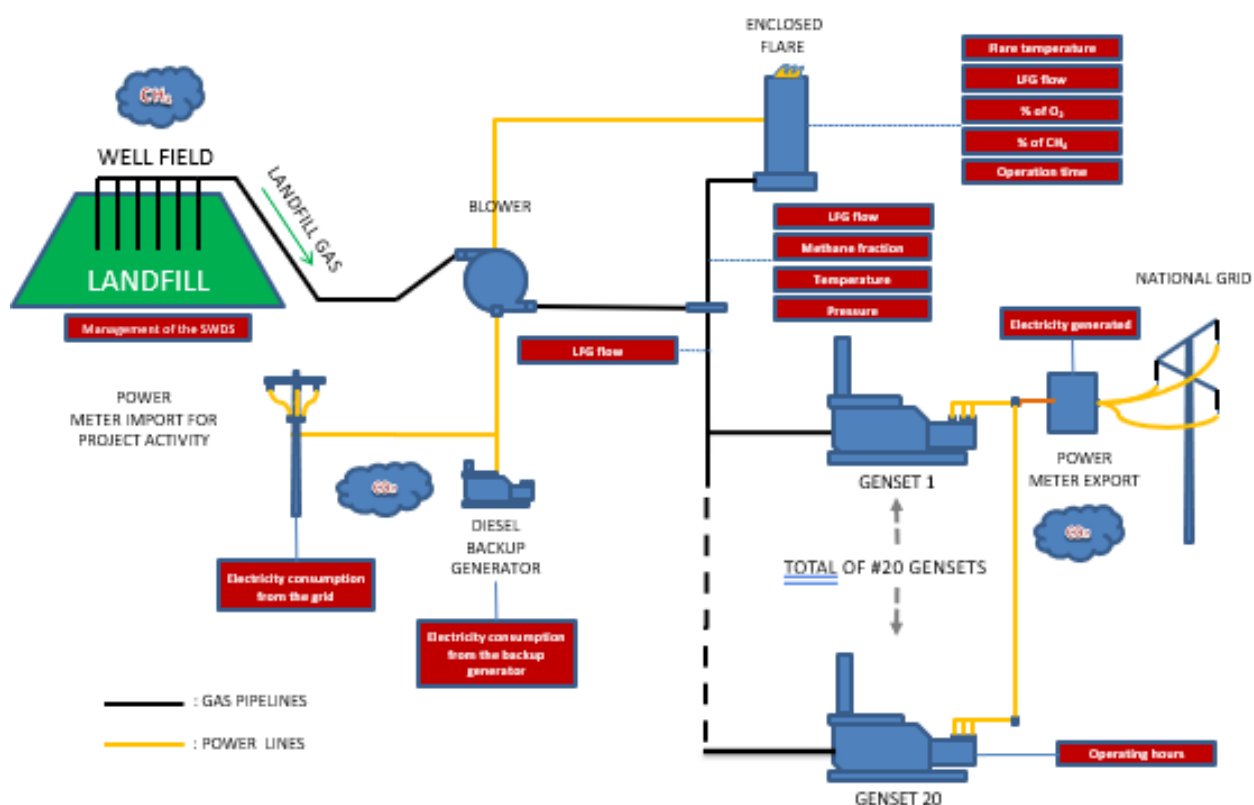


Figure 5: Schematic instrumentation diagram of the project's monitoring system valid for the considered monitoring period

The following equipment/instruments were used during the considered monitoring period to monitor the operation of the GS project activity as established by its monitoring plan:

CH₄/O₂ gas analyzer unit:

A continuous CH₄/O₂ gas analyzer unit is used to continuously measure the CH₄ content/fraction in stream of collected LFG which is sent to the project's methane destruction/utilization devices (i.e. high temperature enclosed flare and engine-generator sets). Moreover, an additional appropriate CH₄/O₂ gas analyzer unit is also used to continuously measure the residual fraction of CH₄ and O₂ in the exhaust gas of the high temperature enclosed flare.

LFG flow meters:

Appropriate LFG flow meters are used to continuously measure the flow of LFG sent to the project's methane destruction/utilization devices (i.e. high temperature enclosed flare and engine-generator sets). Differential pressure LFG flow meters that process measurements of LFG in standard (normalized) temperature and pressure conditions (with measurements being directly processed and recorded in normal cubic meter per hour (Nm³/h per hour)) are installed.

Thermocouple:

The temperature of exhaust gases of the high enclosed temperature flare is continuously measured by an appropriate thermocouple located in the upper section of the high temperature enclosed flare.

Electricity meter(s):

An appropriate bi-directional electricity meter is used to continuously measure the consumption of grid-sourced electricity by the GS project activity and the amount of electricity generated by the project's electricity generation infrastructure which is exported through the electricity grid the GS project activity is connected to.

Safety and emergency procedures:

Safety and emergency working procedures are implemented in order to handle problems with gathering/processing, transferring, recording and/or storing (archiving) of monitoring data. As part of such procedures, measurement records of monitoring data are to be transferred to local drivers/server for additional/complementary archiving with daily data backup procedure being in place.

Project management and staff responsibility definition:

Project management related procedures are in place as part of the GS project activity with trained staff members having clear and defined roles for assuring collection/processing/recording/archiving for monitoring data, therefore ensuring that that sufficient information/data is available for having achieved emission reductions being calculated in a deemed transparent, correct and verifiable manner, therefore ensuring successful verification of GHG emission reductions.

Monitoring data storage (archiving):

The Project developer has in place working procedures to archive all relevant documents and monitoring data. All records are to be kept for at least 2 years after the end of the crediting period of the GS project activity.

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

>>

Data/parameter	OX_{top_layer}
Unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Consistent with how oxidation is accounted for in the CDM methodological tool "Emissions from solid waste disposal sites" (version 08.1)
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	Default value used, according to ACM0001 (version 19.0)
Purpose of data	Calculation of baseline emissions
Additional comment	Applicable to Step A

Data/parameter	GWP_{CH4}
Unit	tCO ₂ /tCH ₄
Description	Global Warming Potential of CH ₄

Source of data	Default value used, according to IPCC Fifth Assessment Report (AR5) ⁴
Value(s) applied	28
Choice of data or Measurement methods and procedures	The applied values are in accordance with the currently applicable guidelines from the GS for the selection and application of the global warming potential.
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable.

Data/parameter	R_u
Unit	Pa.m ³ /kmol.K
Description	Universal ideal gas constant
Source of data	CDM methodological tool "Project emissions from flaring" (version 03.0)
Value(s) applied	8,314
Choice of data or Measurement methods and procedures	Applicable value as per the CDM methodological tool "Project emissions from flaring" (version 03.0), table 1: Constants.
Purpose of data	Calculation of baseline emissions
Additional comment	-

⁴Available online: <https://www.ipcc.ch/assessment-report/ar5/>

Data/parameter	MM _i								
Unit	Kg/kmol								
Description	Molecular mass of greenhouse gas <i>i</i>								
Source of data	CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)								
Value(s) applied	<table><tr><th>Compound</th><th>Structure</th><th>Molecular mass (kg/kmol)</th></tr><tr><td>Methane</td><td>CH₄</td><td>16.04</td></tr></table>			Compound	Structure	Molecular mass (kg/kmol)	Methane	CH ₄	16.04
Compound	Structure	Molecular mass (kg/kmol)							
Methane	CH ₄	16.04							
Choice of data or Measurement methods and procedures	Applicable value as per the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)								
Purpose of data	Calculation of baseline emissions								
Additional comment	-								

Data/parameter	P_n
Unit	Pa
Description	Total pressure at normal conditions
Source of data	Adopted value is in accordance with the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0).
Value(s) applied	101,325
Choice of data or Measurement methods and procedures	Applicable values as per the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0).
Purpose of data	Calculation of baseline emissions

Additional comment	-
--------------------	---

Data/parameter	T_n
Unit	K
Description	Temperature at normal conditions
Source of data	CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0).
Value(s) applied	273.15
Choice of data or Measurement methods and procedures	Applicable value as per the CDM methodological tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0).
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data/parameter	SPEC_{flare}	
Unit	Temperature - °C	
	Flow rate - Nm ³ /h	
	Maintenance schedule - number of days	
Description	Manufacturer's flare specifications for temperature, flow rate and maintenance schedule	
Source of data	Flare Manufacturer.	
Value(s) applied	Flare model	2500 HT
	Minimum flare temperature	850 °C

	Maximum flare temperature	1,200 °C
	Minimum and maximum inlet flow rate	Minimum LFG flow: 500 Nm ³ /h Maximum LFG flow: 2,500 Nm ³ /h
	Maximum duration in days between maintenance events	365 days
Choice of data or Measurement methods and procedures	As established by the CDM methodological tool “Project emissions from flaring” (version 03.0), the flare specifications and operational + maintenance requirements (as set/recommended by the equipment manufacturer) are documented and considered for the ex-ante determination of applicable values for the parameter SPEC_{flare}. During the initial crediting period under the GS4GG, ex-ante selected data is to be compared against monitored data related to the operation of the high temperature enclosed flare, including: a) Minimum and maximum monitoring records for flow of LFG sent to the flare (b) Minimum and maximum monitoring records for temperature in the exhaust gas of the flare; and (c) Duration in days of time periods between maintenance events for the flare.	
Purpose of data	Calculation of baseline emissions	
Additional comment	-	

Data/parameter	EF_{EL,grid,y}
Unit	tCO ₂ /MWh
Description	CO ₂ emission factor for electricity generation / grid-sourced electricity in year y

Source of data	Applicable conservative default values as per the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (by following option A.2 of the underlying methodological tool).
Value(s) applied	1.3 (for electricity imported by the project activity through the electricity grid the project activity is connected to ($EF_{EL,grid,import,y}$)) 0.25 (for electricity exported by the project activity through the electricity grid the project activity is connected to ($EF_{EL,grid,export,y}$))
Choice of data or Measurement methods and procedures	Data is determined as per applicable guidance of the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0).
Purpose of data	Calculation of project emissions (due to the consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to generation of electricity by the GS project activity).
Additional comment	The default values for the CO ₂ emission factor for electricity generation / grid sourced electricity will be used in case required data for the determination of the CO ₂ Combined Margin emission factor for the National Electricity Grid of Brazil or related calculation results are not available for a given monitoring period.

Data/parameter	W_{BM}
Unit	%
Description	Weighting of build margin emissions factor

Source of data	Applicable default value as per the CDM methodological tool "Tool to calculate the emission factor for an electricity system" (version 07.0).
Value(s) applied	0.75 (75%) during the last crediting period of the GS project activity under GS4GG
Choice of data or Measurement methods and procedures	The applicable value for the last crediting period of the GS project activity under GS4GG as per applicable requirements of the CDM methodological tool "Tool to calculate the emission factor for an electricity system" is selected.
Purpose of data	Calculation of project emissions (due to the consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to generation of electricity by the GS project activity).
Additional comment	-

Data/parameter	W_{OM}
Unit	%
Description	Weighting of operating margin emissions factor
Source of data	Applicable default value as per the CDM methodological tool "Tool to calculate the emission factor for an electricity system"
Value(s) applied	0.25 (25%) during the last crediting period of the GS project activity under GS4GG
Choice of data or Measurement methods and procedures	The applicable value for the last crediting period of a GS project activity under GS4GG as per the CDM methodological tool "Tool to calculate the emission factor for an electricity system" (version 07.0) is selected.
Purpose of data	Calculation of project emissions (due to the consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to generation of electricity by the GS project activity).
Additional comment	Calculation of project emissions and baseline emissions.

Data/parameter	$EF_{grid,BM,y}$
Unit	tCO ₂ /MWh
Description	Build margin emission factor of the Brazilian National Electricity Grid
Source of data	Calculations based on parameters described above.
Value(s) applied	0.0270
Choice of data or Measurement methods and procedures	Annual values of build margin emission factor for the Brazilian National Electricity Grid are calculated and published by the CDM Designated National Authority (DNA) of Brazil. The value applicable for the year 2022 is ex-ante determined.
Purpose of data	Calculation of project emissions (due to consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to the displacement by electricity generated by the project's electricity generation infrastructure of equivalent electricity amount which would otherwise be generated by existing grid-connected power plants within the National Electricity Grid of Brazil and addition of new electricity generation sources).
Additional comment	-

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

The following ex-ante determined parameters (that are also included in the registered PDD for the GS project activity) are not used for the purpose of ex-post determination of baseline emissions and 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 (ϕ_{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 ($DOC_{f,\text{default}}$)
- 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)

As also outlined in the registered PDD for the GS project activity, data for the above-listed parameters are used only in the context of ex-ante estimation of annual accumulated values in the context of ex-ante estimation of emission reductions to be achieved by the GS project activity during its 3rd and last GS crediting period. Due to that, details for the above-listed parameters are not included in this Section (as they are not relevant in the context of determination of emission reductions achieved by the GS project activity during the considered monitoring period).

Relevant details for such parameters are included in Section B.6.1 of the registered PDD for the GS project activity.

D.2 Data and parameters monitored

>>

SDG 13:

Data / Parameter	Management of SWDS
Unit	-
Description	Management of SWDS
Source of data	Technical evaluations of the Ecoparque Candeias landfill valid/applicable for the considered monitoring period were performed by the independent 3rd party engineering company "Alta Geotecnia Ambiental Ltda." on 25/05/2023, 01/11/2023, 25/10/2024 and 04/09/2025. As part of the performed annual technical evaluations, the current configuration and operational conditions/status of the Ecoparque Candeias landfill were compared against the previously conceived design and operational conditions of this landfill which were defined prior to the occurred implementation of the GS project activity on the basis of different sources, including inter alia: - Original design documents of the landfill (as described in the documentation required for all phases of the environmental licensing for the Ecoparque Candeias landfill); - Applicable local or national regulations - Expertise and experience of "Alta Geotecnia Ambiental Ltda." with the Ecoparque Candeias landfill. Alta Geotecnia Ambiental Ltda. has performed regular technical inspections at the Ecoparque Candeias landfill (as part of the continuously performed assessment/control of geotechnical stability monitoring for the landfill cells).

	As required by the competent environmental authority from Pernambuco State (Agência Estadual de Meio Ambiente (CPRH)), such particular assessments/controls performed by “Alta Geotecnia Ambiental Ltda.” are performed on a regular basis as a prerequisite for the compliance with related environmental monitoring as a requisite for the maintenance of the validity of the environmental and safety permit/licensing issued for the Ecoparque Candeias landfill.
Value(s) applied	As outlined in the latest issued technical evaluation/declaration report (issued on 04/09/2025, the previously conceived original design of the landfill (that was conceived prior to the occurred implementation of the GS project activity) is confirmed as not to being modified during the whole period from 2007 (when the Ecoparque Candeias landfill started to operate) until its issuance date (thus completely covering the monitoring period from 29/09/2023 to 31/08/2025). This most recently issued technical evaluation report confirms that no practices/measures to deliberately increase methane generation at the Ecoparque Candeias landfill were performed (when compared to management and MSW landfilling practices prior to implementation of the GS project activity or after its occurred implementation). Aspects, conditions and circumstances related to management of the landfill site (e.g. waste disposal, waste covering, waste compacting, management of leachate, draining of rainwater, etc.) were therefore not changed with an aim to increase methane generation on site. It is relevant to note that MSW management business (collection and disposal of MSW) in Brazil has its own economics, dynamics, policies and related regulations. That makes MSW disposal activity for the Ecoparque

Candeias landfill (like other similar/comparable landfills in Brazil) completely independent from the previously occurred registration of the GS project activity under the CDM and/or its later occurred transition to GS4GG and/or promotion of revenues due to commercialization of Certified Emission Reductions (CERs) (issued under the CDM) and/or GS Voluntary Emission Reductions (GS VERs) (to be potentially issued under GS4GG) by the GS project activity promoting collection and destruction/utilization of LFG .

In the particular case of the Ecoparque Candeias landfill, it is important to note that this particular landfill was previously designed, and it has operated *inter alia* as per previously defined terms, conditions and requirements for MSW disposal as part of public service concession contracts previously established between the owner/operator of the landfill and the Administration of the Municipality of Jaboatão de Guararapes and other Municipalities in the region of the landfill.

Moreover, the design and operation of this particular landfill is also under conformance with previously set terms, conditions and requirements as part of the environmental licensing of the landfill. Some of such terms, conditions and requirements are regularly monitored by the competent environmental authority of Pernambuco State Agência Estadual de Meio Ambiente de Pernambuco (CPRH).

While the occurrence of changes in the quantitative or qualitative condition related to MSW disposal at the Ecoparque Candeias landfill are completely independent from GS project activity, the operation of the GS project activity *per se* does not represent any incentive for promoting a change in the management of the landfill (in order *inter alia* to increase the amount of methane generated in the site). Furthermore, the GS project

	activity does not encompass any MSW management related measures. Currently, there is still no climate change or waste management policy in Brazil which would provide an incentive and/or a mandate or requirement to have MSW being disposed in landfills with better/improved LFG collection / destruction systems (such as the project's LFG collection and destruction system currently implemented at the Ecoparque Candeias landfill as part of the GS project activity).
Measurement methods and procedures	Not applicable. No measuring equipment is used for monitoring management of the Ecoparque Candeias landfill.
Monitoring frequency	Annually
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$V_{t,db,j}$								
Unit	m ³ /h								
Description	Volumetric flow of LFG stream in time interval t on a dry basis for j (where j is the LFG delivery pipeline to the flare and/or to each engine-generator set).								
Source of data	Measurements by the project developer using appropriate LFG flow meters.								
Value(s) applied	The set of monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of LFG flow sent to the installed high temperature enclosed flare and/or LFG flow sent to the engine-generator sets during the considered monitoring period. While measurements are performed by two LFG flow meters (one LFG flow meter for the high temperature enclosed flare and one LFG flow meter for the engine-generator sets), the monitoring parameter $V_{t,db}$ is thus measured, recorded and reported on the basis of the following sub-parameters: - $V_{t,db,flare}$: Volumetric flow of LFG to the Flare - $V_{t,db,engines}$: Volumetric flow of LFG to the engine-generator sets								
Measurement methods and procedures	<i>Flow meters alternately used for measuring $V_{t,db,flare}$ (Flare):</i> <table border="1"> <tr> <td>Accuracy</td><td>±2.0%</td></tr> <tr> <td>Manufacturer</td><td>FCI Fluid Components International</td></tr> <tr> <td>Model</td><td>ST51</td></tr> <tr> <td>Serial number</td><td>683688</td></tr> </table>	Accuracy	±2.0%	Manufacturer	FCI Fluid Components International	Model	ST51	Serial number	683688
Accuracy	±2.0%								
Manufacturer	FCI Fluid Components International								
Model	ST51								
Serial number	683688								

Operation period within the considered monitoring period	from 29/03/2023 to 03/05/2024 and from 23/08/2025 to 31/08/2025
Calibration frequency	3 years
Date of performed calibration event	07/11/2022
Certificate number	12661/2022
Validity of performed calibration event	06/11/2025
Date of performed calibration event	24/07/2025
Certificate number	LMH 137/2025
Validity of performed calibration event	23/07/2028

Accuracy	±2.0%
Manufacturer	FCI Fluid Components International
Model	ST51
Serial number	683689
Operation period within the considered monitoring period	from 03/05/2024 to 23/08/2025
Calibration frequency	3 years
Date of performed calibration event	26/02/2024
Certificate number	1779/2024
Validity of performed calibration event	25/02/2027

Flow meters alternately used for measuring $V_{t,db,engines}$ (engine-generator sets):

	Accuracy	±1.5%
	Manufacturer	CONTECH INDUSTRIA E COMERCIO DE EQUIPAMENTOS ELETRONICOS LTDA.
	Model	FT1
	Serial number	2103000243
	Operation period within the considered monitoring period	From 29/09/2023 to 16/11/2023 and from 13/03/2024 to 18/02/2025
	Calibration frequency	3 years
	Date of performed calibration event	01/11/2022
	Certificate number	2103000243 1122 C7
	Validity of performed calibration event	31/10/2025
	Date of performed calibration event	21/02/2024
	Certificate number	2103000243 0224 C7
	Validity of performed calibration event	20/02/2027
	Accuracy	±2.0%
	Manufacturer	FCI Fluid Components International
	Model	ST51
	Serial number	2108000299
	Operation period within the considered monitoring period	From 16/11/2023 to 13/03/2024

	Calibration frequency	3 years
	Date of performed calibration event	24/10/2023
	Certificate number	2108000299 1023 C7
	Validity of performed calibration event	23/10/2026
	Accuracy	±2.0%
	Manufacturer	FCI Fluid Components International
	Model	ST51
	Serial number	2103000244
	Operation period within the considered monitoring period	From 18/02/2025 to 31/08/2025
	Calibration frequency	3 years
	Date of performed calibration event	21/01/2025
	Certificate number	2103000244 0125 C7
	Validity of performed calibration event	20/01/2028
	Monitoring frequency	Continuous measurements of LFG flow are recorded and reported with an every-minute frequency.
	QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
		Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations.
		Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance with

	appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$V_{CH_4,t,db,j}$												
Unit	m ³ gas i/m ³ dry gas												
Description	Volumetric fraction of CH ₄ in the collected LFG in time interval t on a dry basis for j (where j is the LFG delivery pipeline to the flare and/or to each engine-generator set).												
Source of data	Measurements by the project developer using continuous CH ₄ /O ₂ gas analyzer unit.												
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all continuous records of measurement data of CH ₄ content in the collected LFG during the considered monitoring period.												
	<i>CH₄/O₂ gas analyzer unit alternately used for measuring $V_{i,t,db}$.⁵</i> <table> <tr> <td>Accuracy</td><td>±2.0%</td></tr> <tr> <td>Manufacturer</td><td>SIEMENS AG</td></tr> <tr> <td>Model</td><td>Ultramat 23</td></tr> <tr> <td>Serial number</td><td>N1W3009</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025</td></tr> <tr> <td>Calibration frequency</td><td>Annual</td></tr> </table>	Accuracy	±2.0%	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1W3009	Operation period within the considered monitoring period	From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025	Calibration frequency	Annual
Accuracy	±2.0%												
Manufacturer	SIEMENS AG												
Model	Ultramat 23												
Serial number	N1W3009												
Operation period within the considered monitoring period	From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025												
Calibration frequency	Annual												

⁵ Continuous monitoring of LFG O₂ content is not required as per ACM0001 (version 19.0) + applicable methodological tools. Moreover, the monitoring plan of the PDD does not refer to monitoring of LFG O₂ contents either. However, LFG O₂ content is measured due to safety and operational requirements.

	<table><tr><td>Date of performed calibration event</td><td>25/08/2023</td></tr><tr><td>Certificate number</td><td>2482-1/23</td></tr><tr><td>Validity of performed calibration event</td><td>24/08/2024</td></tr><tr><td>Date of performed calibration event</td><td>21/08/2024</td></tr><tr><td>Certificate number</td><td>2619-01/24</td></tr><tr><td>Validity of performed calibration event</td><td>20/08/2025</td></tr><tr><td>Date of performed calibration event</td><td>18/03/2025</td></tr><tr><td>Certificate number</td><td>0273/2025</td></tr><tr><td>Validity of performed calibration event</td><td>17/03/2026</td></tr></table>	Date of performed calibration event	25/08/2023	Certificate number	2482-1/23	Validity of performed calibration event	24/08/2024	Date of performed calibration event	21/08/2024	Certificate number	2619-01/24	Validity of performed calibration event	20/08/2025	Date of performed calibration event	18/03/2025	Certificate number	0273/2025	Validity of performed calibration event	17/03/2026	
	Date of performed calibration event	25/08/2023																		
	Certificate number	2482-1/23																		
	Validity of performed calibration event	24/08/2024																		
	Date of performed calibration event	21/08/2024																		
	Certificate number	2619-01/24																		
	Validity of performed calibration event	20/08/2025																		
	Date of performed calibration event	18/03/2025																		
	Certificate number	0273/2025																		
	Validity of performed calibration event	17/03/2026																		
	<table><tr><td>Accuracy</td><td>±2.0%</td></tr><tr><td>Manufacturer</td><td>SIEMENS AG</td></tr><tr><td>Model</td><td>Ultramat 23</td></tr><tr><td>Serial number</td><td>N1RO280</td></tr><tr><td>Operation period within the considered monitoring period</td><td>From 12/01/2024 to 26/02/2024</td></tr><tr><td>Calibration frequency</td><td>Annual</td></tr><tr><td>Date of performed calibration event</td><td>29/11/2023</td></tr><tr><td>Certificate number</td><td>ISO11459/2023</td></tr><tr><td>Validity of the performed calibration event</td><td>28/11/2024</td></tr></table>	Accuracy	±2.0%	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1RO280	Operation period within the considered monitoring period	From 12/01/2024 to 26/02/2024	Calibration frequency	Annual	Date of performed calibration event	29/11/2023	Certificate number	ISO11459/2023	Validity of the performed calibration event	28/11/2024	
	Accuracy	±2.0%																		
	Manufacturer	SIEMENS AG																		
	Model	Ultramat 23																		
	Serial number	N1RO280																		
	Operation period within the considered monitoring period	From 12/01/2024 to 26/02/2024																		
	Calibration frequency	Annual																		
	Date of performed calibration event	29/11/2023																		
	Certificate number	ISO11459/2023																		
Validity of the performed calibration event	28/11/2024																			
Monitoring frequency	Continuous measurements of CH ₄ fraction in collected LFG are recorded and reported with an every-minute frequency.																			
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project																			

	activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance with appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$V_{O_2,EG,m}$										
Unit	-										
Description	Volumetric fraction of O ₂ in the exhaust gas on a dry basis at reference conditions in the minute <i>m</i>										
Source of data	Measurements by the project developer using a continuous CH ₄ /O ₂ gas analyzer unit.										
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of O ₂ content in the exhaust gas of the flare during the considered monitoring period.										
Measurement methods and procedures	<i>CH₄/O₂ Gas analyzer units used for measuring $V_{O_2,EG,m}$:</i> <table> <tr> <td>Accuracy</td><td>±0.2% (for O₂ content)</td></tr> <tr> <td>Manufacturer</td><td>SIEMENS AG</td></tr> <tr> <td>Model</td><td>Ultramat 23</td></tr> <tr> <td>Serial number</td><td>N1M6685</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>from 29/09/2023 to 21/08/2024</td></tr> </table>	Accuracy	±0.2% (for O ₂ content)	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1M6685	Operation period within the considered monitoring period	from 29/09/2023 to 21/08/2024
Accuracy	±0.2% (for O ₂ content)										
Manufacturer	SIEMENS AG										
Model	Ultramat 23										
Serial number	N1M6685										
Operation period within the considered monitoring period	from 29/09/2023 to 21/08/2024										

			and from 20/08/2025 to 31/08/2025
	Calibration frequency		Annual
	Date of performed calibration event valid		25/08/2023
	Certificate number		2482-1/2023
	Validity of performed calibration event		24/08/2024
	Date of performed calibration event valid		14/08/2025
	Certificate number		ISO07298/2025
	Validity of performed calibration event		13/08/2026
	Accuracy		±0.2% (for O ₂ content)
	Manufacturer		SIEMENS AG
	Model		Ultramat 23
	Serial number		N1C7779
	Operation period within the considered monitoring period		From 21/08/2024 to 20/08/2025
	Calibration frequency		Annual
	Date of performed calibration event valid		21/08/2024
	Certificate number		2619-03/2024
	Validity of performed calibration event		20/08/2025
Monitoring frequency	Continuous measurements are recorded and reported with an every-minute frequency.		
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS		

	project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency.

Data / Parameter	$V_{RG,m}$
Unit	m^3
Description	Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m
Source of data	Measurements by the project developer using LFG flow meter.
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of LFG flow sent to the installed high temperature enclosed flare during the considered monitoring period. Since the parameter $V_{RG,m}$ is only applicable to the installed high temperature enclosed flare, it is thus equal to the sub-parameter $V_{t,db,flare}$ (volumetric flow of LFG to the Flare).

Measurement methods and procedures

Flow meters alternately used for measuring $V_{RG,m}$:

Accuracy	±2.0%
Manufacturer	FCI Fluid Components International
Model	ST51
Serial number	683688
Operation period within the considered monitoring period	from 29/03/2023 to 03/05/2024 and from 23/08/2025 to 31/08/2025
Calibration frequency	3 years
Date of performed calibration event	07/11/2022
Certificate number	12661/2022
Validity of performed calibration event	06/11/2025
Date of performed calibration event	24/07/2025
Certificate number	LMH 137/2025
Validity of performed calibration event	23/07/2028

Accuracy	±2.0%
Manufacturer	FCI Fluid Components International
Model	ST51
Serial number	683689
Operation period within the considered monitoring period	from 03/05/2024 to 23/08/2025
Calibration frequency	3 years
Date of performed calibration event	26/02/2024

	<table border="1"> <tr> <td>Certificate number</td><td>1779/2024</td></tr> <tr> <td>Validity of performed calibration event</td><td>25/02/2027</td></tr> </table>	Certificate number	1779/2024	Validity of performed calibration event	25/02/2027
Certificate number	1779/2024				
Validity of performed calibration event	25/02/2027				
Monitoring frequency	Continuous measurements of LFG flow are recorded and reported with an every-minute frequency.				
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.				
Purpose of data	Calculation of baseline emissions.				
Additional comment	-				

Data / Parameter	$V_{i, RG, m}$
Unit	-
Description	Volumetric fraction of component i in the residual gas on a dry basis in the minute m
Source of data	Measurements by the project developer using a continuous CH ₄ /O ₂ gas analyzer unit.
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of CH ₄ content in the

	collected LFG which is sent to the during the considered monitoring period.																																						
Measurement methods and procedures	<i>CH₄/O₂ gas analyzer units used for measuring $v_{i,RG,m}$:</i> <table> <tr> <td>Accuracy</td><td>±2.0%</td></tr> <tr> <td>Manufacturer</td><td>SIEMENS AG</td></tr> <tr> <td>Model</td><td>Ultramat 23</td></tr> <tr> <td>Serial number</td><td>N1W3009</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025</td></tr> <tr> <td>Calibration frequency</td><td>Annual</td></tr> <tr> <td>Date of performed calibration event</td><td>25/08/2023</td></tr> <tr> <td>Certificate number</td><td>2482-1/23</td></tr> <tr> <td>Validity of performed calibration event</td><td>24/08/2024</td></tr> <tr> <td>Date of performed calibration event</td><td>21/08/2024</td></tr> <tr> <td>Certificate number</td><td>2619-01/24</td></tr> <tr> <td>Validity of performed calibration event</td><td>20/08/2025</td></tr> <tr> <td>Date of performed calibration event</td><td>18/03/2025</td></tr> <tr> <td>Certificate number</td><td>0273/2025</td></tr> <tr> <td>Validity of performed calibration event</td><td>17/03/2026</td></tr> </table> <table> <tr> <td>Accuracy</td><td>±2.0%</td></tr> <tr> <td>Manufacturer</td><td>SIEMENS AG</td></tr> <tr> <td>Model</td><td>Ultramat 23</td></tr> <tr> <td>Serial number</td><td>N1RO280</td></tr> </table>	Accuracy	±2.0%	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1W3009	Operation period within the considered monitoring period	From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025	Calibration frequency	Annual	Date of performed calibration event	25/08/2023	Certificate number	2482-1/23	Validity of performed calibration event	24/08/2024	Date of performed calibration event	21/08/2024	Certificate number	2619-01/24	Validity of performed calibration event	20/08/2025	Date of performed calibration event	18/03/2025	Certificate number	0273/2025	Validity of performed calibration event	17/03/2026	Accuracy	±2.0%	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1RO280
Accuracy	±2.0%																																						
Manufacturer	SIEMENS AG																																						
Model	Ultramat 23																																						
Serial number	N1W3009																																						
Operation period within the considered monitoring period	From 29/09/2023 to 12/01/2024 and from 26/02/2024 to 31/08/2025																																						
Calibration frequency	Annual																																						
Date of performed calibration event	25/08/2023																																						
Certificate number	2482-1/23																																						
Validity of performed calibration event	24/08/2024																																						
Date of performed calibration event	21/08/2024																																						
Certificate number	2619-01/24																																						
Validity of performed calibration event	20/08/2025																																						
Date of performed calibration event	18/03/2025																																						
Certificate number	0273/2025																																						
Validity of performed calibration event	17/03/2026																																						
Accuracy	±2.0%																																						
Manufacturer	SIEMENS AG																																						
Model	Ultramat 23																																						
Serial number	N1RO280																																						

	Operation period within the considered monitoring period	From 12/01/2024 to 26/02/2024
	Calibration frequency	Annual
	Date of performed calibration event	29/11/2023
	Certificate number	ISO11459/2023
	Validity of the performed calibration event	28/11/2024
Monitoring frequency	Continuous measurements are recorded and reported with an every-minute frequency.	
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance with appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.	
Purpose of data	Calculation of baseline emissions.	
Additional comment	Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency.	

Data / Parameter	$M_{RG,m}$																
Unit	kg																
Description	Mass flow of the residual gas on a dry basis at reference conditions in the minute m																
Source of data	Measurements by the project developer using flow meter.																
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of LFG flow sent to the installed high temperature enclosed flare during the considered monitoring period. Since the parameter $M_{RG,m}$ is only applicable to the installed high temperature enclosed flare, it is thus equal to the sub-parameter $V_{t,db,flare}$ (volumetric flow of LFG to the Flare).																
Measurement methods and procedures	<i>Flow meters alternately used for measuring $M_{RG,m}$:</i> <table> <tr> <td>Accuracy</td><td>$\pm 2.0\%$</td></tr> <tr> <td>Manufacturer</td><td>FCI Fluid Components International</td></tr> <tr> <td>Model</td><td>ST51</td></tr> <tr> <td>Serial number</td><td>683688</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>from 29/03/2023 to 03/05/2024 and from 23/08/2025 to 31/08/2025</td></tr> <tr> <td>Calibration frequency</td><td>3 years</td></tr> <tr> <td>Date of performed calibration event</td><td>07/11/2022</td></tr> <tr> <td>Certificate number</td><td>12661/2022</td></tr> </table>	Accuracy	$\pm 2.0\%$	Manufacturer	FCI Fluid Components International	Model	ST51	Serial number	683688	Operation period within the considered monitoring period	from 29/03/2023 to 03/05/2024 and from 23/08/2025 to 31/08/2025	Calibration frequency	3 years	Date of performed calibration event	07/11/2022	Certificate number	12661/2022
Accuracy	$\pm 2.0\%$																
Manufacturer	FCI Fluid Components International																
Model	ST51																
Serial number	683688																
Operation period within the considered monitoring period	from 29/03/2023 to 03/05/2024 and from 23/08/2025 to 31/08/2025																
Calibration frequency	3 years																
Date of performed calibration event	07/11/2022																
Certificate number	12661/2022																

	Validity of performed calibration event	06/11/2025
	Date of performed calibration event	24/07/2025
	Certificate number	LMH 137/2025
	Validity of performed calibration event	23/07/2028
	Accuracy	±2.0%
	Manufacturer	FCI Fluid Components International
	Model	ST51
	Serial number	683689
	Operation period within the considered monitoring period	from 03/05/2024 to 23/08/2025
	Calibration frequency	3 years
	Date of performed calibration event	26/02/2024
	Certificate number	1779/2024
	Validity of performed calibration event	25/02/2027
Monitoring frequency	Continuous measurements are recorded and reported with an every-minute frequency.	
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to	

	appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	Monitoring of this parameter is applicable in case of enclosed flares and continuous monitoring of the flare efficiency and if project developer selects to monitor $M_{RG,m}$ directly, instead of calculating. Monitoring this parameter may also be necessary to confirm that the manufacturer's specifications for flow rate/heat flux are met. In this case the flow rate should be measured on a kg/h basis.

Data / Parameter	$f_{CH_4,EG,m}$								
Unit	mg/m ³								
Description	Concentration of methane in the exhaust gas of the flare on a dry basis at reference conditions in the minute m								
Source of data	Measurements by the project developer using a continuous CH ₄ /O ₂ gas analyzer unit.								
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of O ₂ content in the exhaust gas of the flare during the considered monitoring period.								
Measurement methods and procedures	<i>CH₄/O₂ Gas analyzer unit used for measuring $f_{CH_4,EG,m}$:</i> <table border="1"> <tr> <td>Accuracy</td><td>±0.2% (for O₂ content)</td></tr> <tr> <td>Manufacturer</td><td>SIEMENS AG</td></tr> <tr> <td>Model</td><td>Ultramat 23</td></tr> <tr> <td>Serial number</td><td>N1M6685</td></tr> </table>	Accuracy	±0.2% (for O ₂ content)	Manufacturer	SIEMENS AG	Model	Ultramat 23	Serial number	N1M6685
Accuracy	±0.2% (for O ₂ content)								
Manufacturer	SIEMENS AG								
Model	Ultramat 23								
Serial number	N1M6685								

	Operation period within the considered monitoring period	from 29/09/2023 to 21/08/2024 and from 20/08/2025 to 31/08/2025
	Calibration frequency	Annual
	Date of performed calibration event valid	25/08/2023
	Certificate number	2482-1/2023
	Validity of performed calibration event	24/08/2024
	Date of performed calibration event valid	14/08/2025
	Certificate number	ISO07298/2025
	Validity of performed calibration event	13/08/2026
	Accuracy	±0.2% (for O ₂ content)
	Manufacturer	SIEMENS AG
	Model	Ultramat 23
	Serial number	N1C7779
	Operation period within the considered monitoring period	From 21/08/2024 to 20/08/2025
	Calibration frequency	Annual
	Date of performed calibration event valid	21/08/2024
	Certificate number	2619-03/2024
	Validity of performed calibration event	20/08/2025
Monitoring frequency	Continuous measurements are recorded and reported with an every-minute frequency.	

QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency.

Data / Parameter	T_t
Unit	K
Description	Temperature of the LFG stream in time interval t
Source of data	Measurements by the project developer using a temperature sensor.
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of temperature of collected LFG during the considered monitoring period.
Measurement methods and procedures	<i>Temperature sensor used for measuring T_t:</i>

Accuracy	±0.1%
Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.
Model	PT 100
Serial number	N2035.748336
Operation period within the considered monitoring period	From 29/09/2023 to 11/01/2024
Calibration frequency	Annual
Date of performed calibration event	18/01/2023
Certificate number	9W3W1923
Validity of performed calibration event	17/01/2024

Accuracy	±0.1%
Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.
Model	PT 100
Serial number	N2321.306656
Operation period within the considered monitoring period	From 11/01/2024 to 11/12/2024 and from 25/07/2025 to 31/08/2025
Calibration frequency	Annual
Date of performed calibration event	13/12/2023
Certificate number	14363/23
Validity of performed calibration event	12/12/2024
Date of performed calibration event	20/06/2025

	Certificate number	Z08K1025
		Validity of performed calibration event
	19/06/2026	
	Accuracy	±0.1%
	Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.
	Model	PT 100
	Serial number	N2321.306655
	Operation period within the considered monitoring period	From 11/12/2024 to 25/07/2025
	Calibration frequency	Annual
	Date of performed calibration event	31/07/2024
	Certificate number	E60QWZ24
	Validity of performed calibration event	30/07/2025
Monitoring frequency	Continuous measurements of LFG temperature are recorded and reported with an every-minute frequency.	
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance with appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.	

Purpose of data	Calculation of baseline emissions.
Additional comment	Provided all LFG measurement parameters are converted to normal conditions (Standard temperature and pressure conditions) as part of the monitoring process in place, monitoring of T_t is not required (except for the determination of moisture content).

Data / Parameter	P_t														
Unit	Pa														
Description	Pressure of the LFG stream in time interval t														
Source of data	Measurements by the project developer using a pressure sensor														
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed with this Monitoring Report) include all records of measurement data of pressure of collected LFG during the considered monitoring period.														
Measurement methods and procedures	<i>Pressure sensor used for measuring P_t:</i> <table> <tr> <td>Accuracy</td><td>±0.1%</td></tr> <tr> <td>Manufacturer</td><td>SMAR Technology Company</td></tr> <tr> <td>Model</td><td>LD301</td></tr> <tr> <td>Serial number</td><td>U658008</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>From 29/09/2023 to 10/10/2023 and from 04/10/2024 to 14/08/2025</td></tr> <tr> <td>Calibration frequency</td><td>2 years</td></tr> <tr> <td>Date of performed calibration event(s) valid</td><td>07/10/2022</td></tr> </table>	Accuracy	±0.1%	Manufacturer	SMAR Technology Company	Model	LD301	Serial number	U658008	Operation period within the considered monitoring period	From 29/09/2023 to 10/10/2023 and from 04/10/2024 to 14/08/2025	Calibration frequency	2 years	Date of performed calibration event(s) valid	07/10/2022
Accuracy	±0.1%														
Manufacturer	SMAR Technology Company														
Model	LD301														
Serial number	U658008														
Operation period within the considered monitoring period	From 29/09/2023 to 10/10/2023 and from 04/10/2024 to 14/08/2025														
Calibration frequency	2 years														
Date of performed calibration event(s) valid	07/10/2022														

for the considered monitoring period	
Certificate number	2022/04691
Validity of the performed calibration event(s)	06/10/2024
Date of performed calibration event(s) valid for the considered monitoring period	15/08/2024
Certificate number	P-8807/24
Validity of the performed calibration event(s)	14/08/2026

Accuracy	±0.1%
Manufacturer	SMAR Technology Company
Model	LD301
Serial number	U635935
Operation period within the considered monitoring period	From 10/10/2023 to 04/10/2024 and from 14/08/2025 to 31/08/2025
Calibration frequency	2 years
Date of performed calibration event(s) valid for the considered monitoring period	10/10/2023
Certificate number	P-9998/23
Validity of the performed calibration event(s)	09/10/2025
Date of performed calibration event(s) valid for the considered monitoring period	13/06/2025

	Certificate number	P-7530/25
	Validity of the performed calibration event(s)	12/06/2026
Monitoring frequency	Continuous measurements of LFG pressure are recorded and reported with an every-minute frequency.	
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.	
Purpose of data	Calculation of baseline emissions.	
Additional comment	Provided all LFG measurement parameters are converted to normal conditions (Standard temperature and pressure conditions) as part of the monitoring process in place, monitoring of T_t is not required (except for the determination of moisture content).	

Data / Parameter	EC_{PJ,grid,y}
Unit	MWh
Description	Quantity of electricity consumed from the grid by the project activity during the year y;

Source of data	Measurements by the project developer using an appropriate electricity meter.																																												
Value(s) applied	Annual values of grid-sourced electricity consumed by the GS project activity during the considered monitoring period are as follows: <table> <tr> <th>Month/Year</th><th>Amount of grid-sourced electricity consumed by the GS project activity (MWh)⁶</th></tr> <tr> <td>September/2023 (from 29/09/2023 to 30/09/2023)</td><td>0</td></tr> <tr> <td>October/2023</td><td>0.164</td></tr> <tr> <td>November/2023</td><td>0</td></tr> <tr> <td>December/2023</td><td>0</td></tr> <tr> <td>January/2024</td><td>0</td></tr> <tr> <td>February/2024</td><td>0</td></tr> <tr> <td>March/2024</td><td>0</td></tr> <tr> <td>April/2024</td><td>1.831</td></tr> <tr> <td>May/2024</td><td>0.216</td></tr> <tr> <td>June/2024</td><td>0.269</td></tr> <tr> <td>July/2024</td><td>0.998</td></tr> <tr> <td>August/2024</td><td>0.379</td></tr> <tr> <td>September/2024</td><td>0</td></tr> <tr> <td>October/2024</td><td>0.230</td></tr> <tr> <td>November/2024</td><td>0.889</td></tr> <tr> <td>December/2024</td><td>0.630</td></tr> <tr> <td>January/2025</td><td>0.258</td></tr> <tr> <td>February/2025</td><td>0.245</td></tr> <tr> <td>March/2025</td><td>26.653</td></tr> <tr> <td>April/2025</td><td>2.838</td></tr> <tr> <td>May/2025</td><td>0.092</td></tr> </table>	Month/Year	Amount of grid-sourced electricity consumed by the GS project activity (MWh) ⁶	September/2023 (from 29/09/2023 to 30/09/2023)	0	October/2023	0.164	November/2023	0	December/2023	0	January/2024	0	February/2024	0	March/2024	0	April/2024	1.831	May/2024	0.216	June/2024	0.269	July/2024	0.998	August/2024	0.379	September/2024	0	October/2024	0.230	November/2024	0.889	December/2024	0.630	January/2025	0.258	February/2025	0.245	March/2025	26.653	April/2025	2.838	May/2025	0.092
Month/Year	Amount of grid-sourced electricity consumed by the GS project activity (MWh) ⁶																																												
September/2023 (from 29/09/2023 to 30/09/2023)	0																																												
October/2023	0.164																																												
November/2023	0																																												
December/2023	0																																												
January/2024	0																																												
February/2024	0																																												
March/2024	0																																												
April/2024	1.831																																												
May/2024	0.216																																												
June/2024	0.269																																												
July/2024	0.998																																												
August/2024	0.379																																												
September/2024	0																																												
October/2024	0.230																																												
November/2024	0.889																																												
December/2024	0.630																																												
January/2025	0.258																																												
February/2025	0.245																																												
March/2025	26.653																																												
April/2025	2.838																																												
May/2025	0.092																																												

⁶ Since the electricity demand of the GS project activity is provided by its own electricity generation component, during several months of the considered monitoring period there was no verified consumption of grid electricity.

	<table><tr><td>June/2025</td><td>0.265</td></tr><tr><td>July/2025</td><td>0.406</td></tr><tr><td>August/2025</td><td>4.803</td></tr></table>	June/2025	0.265	July/2025	0.406	August/2025	4.803																
June/2025	0.265																						
July/2025	0.406																						
August/2025	4.803																						
Measurement methods and procedures	<i>Electricity meter used for measuring $EC_{PJ1,y}$:</i> <table><tr><td>Accuracy</td><td>0.10%</td></tr><tr><td>Manufacturer</td><td>SCHNEIDER Electric</td></tr><tr><td>Model</td><td>ION 8650</td></tr><tr><td>Serial number</td><td>1807A325-02</td></tr><tr><td>Calibration frequency</td><td>5 years</td></tr><tr><td>Date of performed calibration event</td><td>13/11/2018</td></tr><tr><td>Certificate number</td><td>CAL005/2018</td></tr><tr><td>Validity of performed calibration event</td><td>12/11/2023</td></tr><tr><td>Date of performed calibration event</td><td>06/03/2023</td></tr><tr><td>Certificate number</td><td>CC-0046-24</td></tr><tr><td>Validity of performed calibration event</td><td>05/03/2028</td></tr></table>	Accuracy	0.10%	Manufacturer	SCHNEIDER Electric	Model	ION 8650	Serial number	1807A325-02	Calibration frequency	5 years	Date of performed calibration event	13/11/2018	Certificate number	CAL005/2018	Validity of performed calibration event	12/11/2023	Date of performed calibration event	06/03/2023	Certificate number	CC-0046-24	Validity of performed calibration event	05/03/2028
Accuracy	0.10%																						
Manufacturer	SCHNEIDER Electric																						
Model	ION 8650																						
Serial number	1807A325-02																						
Calibration frequency	5 years																						
Date of performed calibration event	13/11/2018																						
Certificate number	CAL005/2018																						
Validity of performed calibration event	12/11/2023																						
Date of performed calibration event	06/03/2023																						
Certificate number	CC-0046-24																						
Validity of performed calibration event	05/03/2028																						
Monitoring frequency	Continuous measurements of consumption of grid-source electricity are aggregated and reported monthly.																						
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer’s recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international																						

	standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of project emissions.
Additional comment	The data will be archived throughout the crediting period and two years thereafter.

Data / Parameter	$EF_{grid,OM,y} = EF_{grid,OM-DD,y}$
Unit	tCO ₂ /MWh
Description	Operation margin CO ₂ emission factor in year y = Dispatch data analysis operating margin CO ₂ emission factor in year y .
Source of data	Calculations based on parameters described above.
Value(s) applied	For year 2023: 0.3786 ⁷ For year 2024: 0.4473 For January/2025: 0.0237 For February/2025: 0.0248 For March/2025: 0.0215 For April/2025: 0.0289 For May/2025: 0.0309 For June/2025: 0.0455 For July/2025: 0.5290 For August/2025: 0.5530
Measurement methods and procedures	The operating margin emission factor is calculated ex-post
Monitoring frequency	Annual
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
Purpose of data	Calculation of project emissions (due to consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to the displacement by electricity generated by the project's electricity generation

⁷ Data available online:

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

	infrastructure of equivalent electricity amount which would otherwise be generated by existing grid-connected power plants within the National Electricity Grid of Brazil and addition of new electricity generation sources).
Additional comment	All data and parameters to determine the grid electricity emission factor, as required by the "Tool to calculate the emission factor for an electricity system" (version 07.0), were included in the monitoring plan.

Data / Parameter	$O_{pj,h}$
Unit	-
Description	Operation of the equipment that consumes LFG (engine-generator sets of the electricity generation infrastructure)
Source of data	The electronic control system for each installed engine-generator set continuously monitors its operational status ("on" for under operation or "off" for not under operation).
Value(s) applied	While the operational status for each engine-generator set consuming LFG is independently monitored, the monitoring parameter $O_{pj,h}$ is recorded and reported on the basis of the following sub-parameters: - $O_{\text{engine-1},h}$: Operation of the engine-generator set 1 - $O_{\text{engine-2},h}$: Operation of the engine-generator set 2 - $O_{\text{engine-3},h}$: Operation of the engine-generator set 3 - $O_{\text{engine-4},h}$: Operation of the engine-generator set 4 - $O_{\text{engine-5},h}$: Operation of the engine-generator set 5 - $O_{\text{engine-6},h}$: Operation of the engine-generator set 6 - $O_{\text{engine-7},h}$: Operation of the engine-generator set 7 - $O_{\text{engine-8},h}$: Operation of the engine-generator set 8 - $O_{\text{engine-9},h}$: Operation of the engine-generator set 9 - $O_{\text{engine-10},h}$: Operation of the engine-generator set 10

	- $Op_{\text{engine-11,h}}$: Operation of the engine-generator set 11 - $Op_{\text{engine-12,h}}$: Operation of the engine-generator set 12 - $Op_{\text{engine-13,h}}$: Operation of the engine-generator set 13 - $Op_{\text{engine-14,h}}$: Operation of the engine-generator set 14 - $Op_{\text{engine-15,h}}$: Operation of the engine-generator set 15 - $Op_{\text{engine-16,h}}$: Operation of the engine-generator set 16 - $Op_{\text{engine-17,h}}$: Operation of the engine-generator set 17 - $Op_{\text{engine-18,h}}$: Operation of the engine-generator set 18 - $Op_{\text{engine-19,h}}$: Operation of the engine-generator set 19 - $Op_{\text{engine-20,h}}$: Operation of the engine-generator set 20 For each one of the 20 installed engine-generator sets, records for every-minute operational status of the engine (engine-generator sets under operation ("on") = 1 or not under operation ("off") = 0) are made available in the emission reduction calculation spreadsheets.
Measurement methods and procedures	For each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring any one or more of the following two applicable parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the equipment. Document and justify the location and minimum threshold in the registered GS4GG PDD for the GS project activity. (b) Flame. Flame detection system is used to ensure that the equipment is in operation; I Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. $Op_{j,h}=0$ when:

	(a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); I No products are generated in the hour h. Otherwise, $O_{pj,h}=1$
Monitoring frequency	Once per minute
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
Purpose of data	Calculation of baseline emissions.
Additional comment	In the particular case of the GS project activity the only equipment that consumes LFG (and for which the monitoring parameter $O_{pj,h}$ is applicable to) are the engine-generator sets. As per ACM0001 (version 19.0), the monitoring parameter $O_{pj,h}$ is not applicable to the project's high temperature enclosed flare.

Data / Parameter	$T_{EG,m}$
Unit	°C
Description	Temperature in the exhaust gas of the enclosed flare in minute m
Source of data	Measurements by the project developer using appropriate thermocouple(s).
Value(s) applied	The monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report) include all records of measurement data of temperature in the

	exhaust gas of the flare during the considered monitoring period.																														
Measurement methods and procedures	<i>Thermocouples alternately used for measuring $T_{EG,m}$:</i> <table> <tr> <td>Accuracy</td><td>±0.25%</td></tr> <tr> <td>Manufacturer</td><td>ECIL Produtos e Sistemas de Medição e Controle Ltda.</td></tr> <tr> <td>Model</td><td>Type S</td></tr> <tr> <td>Serial number</td><td>2010.963440</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>From 29/09/2023 to 03/05/2024</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> <tr> <td>Date of performed calibration event(s) valid for the considered monitoring period</td><td>09/05/2023</td></tr> <tr> <td>Certificate number</td><td>T-3051/23</td></tr> <tr> <td>Validity of the performed calibration event(s)</td><td>08/05/2024</td></tr> </table> <table> <tr> <td>Accuracy</td><td>±0.25%</td></tr> <tr> <td>Manufacturer</td><td>ECIL Produtos e Sistemas de Medição e Controle Ltda.</td></tr> <tr> <td>Model</td><td>Type S</td></tr> <tr> <td>Serial number</td><td>N2220.014163</td></tr> <tr> <td>Operation period within the considered monitoring period</td><td>From 03/05/2024 to 08/10/2024</td></tr> <tr> <td>Calibration frequency</td><td>1 year</td></tr> </table>	Accuracy	±0.25%	Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.	Model	Type S	Serial number	2010.963440	Operation period within the considered monitoring period	From 29/09/2023 to 03/05/2024	Calibration frequency	1 year	Date of performed calibration event(s) valid for the considered monitoring period	09/05/2023	Certificate number	T-3051/23	Validity of the performed calibration event(s)	08/05/2024	Accuracy	±0.25%	Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.	Model	Type S	Serial number	N2220.014163	Operation period within the considered monitoring period	From 03/05/2024 to 08/10/2024	Calibration frequency	1 year
Accuracy	±0.25%																														
Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.																														
Model	Type S																														
Serial number	2010.963440																														
Operation period within the considered monitoring period	From 29/09/2023 to 03/05/2024																														
Calibration frequency	1 year																														
Date of performed calibration event(s) valid for the considered monitoring period	09/05/2023																														
Certificate number	T-3051/23																														
Validity of the performed calibration event(s)	08/05/2024																														
Accuracy	±0.25%																														
Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.																														
Model	Type S																														
Serial number	N2220.014163																														
Operation period within the considered monitoring period	From 03/05/2024 to 08/10/2024																														
Calibration frequency	1 year																														

Date of performed calibration event(s) valid for the considered monitoring period	11/10/2023
Certificate number	T-7325/23
Validity of the performed calibration event(s)	10/10/2024

Accuracy	±0.25%
Manufacturer	ECIL Produtos e Sistemas de Medição e Controle Ltda.
Model	Type S
Serial number	N2418.336632
Operation period within the considered monitoring period	From 08/10/2024 to 31/08/2025
Calibration frequency	1 year
Date of performed calibration event(s) valid for the considered monitoring period	28/08/2024
Certificate number	9127/24
Validity of the performed calibration event(s)	27/08/2025

A relative delay in performing the calibration events for the installed thermocouple used for measuring temperature in the exhaust gas of the Flare occurred during the considered monitoring period. While the thermocouple with Serial Number (S/N) N2418.336632 was initially calibrated on 28/08/2024, the validity of the performed calibration is 27/08/2025. Since this equipment has operated until the end of the monitoring period (31/08/2025), therefore not meeting the

	calibration frequency recommended for this monitoring equipment. Thus, a non-conformance with the monitoring frequency for the monitoring equipment is acknowledged. By taking into account the applicable provisions from the GS4GG Validation and Verification Standard (GS4GG-VVS), a conservative correction factor of $\pm 0.25\%$ was systematically applied in all related every-minute measurement records for the monitoring parameter $T_{EG,m}$ as part of the calculation of baseline emissions for the period affected by the occurred calibration event delay (period from 27/08/2025 to 31/08/2025).
Monitoring frequency	Continuous measurements are recorded and reported with an every-minute frequency.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance with appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.

Data / Parameter	Flame_m
Unit	Flame on or Flame off
Description	Flame detection of flare in the minute <i>m</i>

Source of data	Measurements by the project developer using a continuous ultraviolet (UV) flame detector. Whenever flame is detected in the flare, flame status "on" or "1" value is attributed. Whenever no flame is detected in the flare, flame status "off" or "0" is attributed.
Value(s) applied	Values for the installed high temperature enclosed flare are reported in the monthly emission reduction calculation spreadsheets (that are enclosed to this Monitoring Report).
Measurement methods and procedures	<i>UV Flame detector used for measuring $Flame_m$:</i> - Manufacturer: Honeywell Analytics Ltd. - Model: C7061A Dynamic Self-Check Ultra-VioletUltraviolet Flame Detector - Serial Number: 10371 - Calibration frequency: No calibration is required as the equipment has a self-checking function.
Monitoring frequency	Measurement data for flame detection/status is recorded and reported with an every-minute frequency.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	Maintenance_y
Unit	Calendar dates
Description	Maintenance events completed in year <i>y</i> as monitored by the project developer.
Source of data	Maintenance logs
Value(s) applied	The following relevant maintenance events (inspection and maintenance services) are applicable for the installed high temperature enclosed flare for the considered monitoring period: Maintenance events dated 10/08/2023, 03/05/2024, 08/10/2024 and 05/08/2025: General inspection/maintenance service on the installed high temperature enclosed flare (incl. inspection of the condition of the flare isolation ceramics revetment material, checking of conditions of the LPG supply valve for pilot flame, 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 LPG injectors, checking of painting conditions). As per the applied maintenance practice for the GS project activity, general inspection/maintenance services are opportunely performed in the flare during its planned or unplanned interruptions of operations within a time interval between 2 performed inspection/maintenance services events never higher than 12 months. Performed maintenance and overhauling services in the flare are performed under by specialized technical service

	team under conformance with maintenance requirements for the flare (as established by equipment manufacturer) and as required by the ex-ante determined parameter SPEC _{flare} . Further details about the parameter SPEC _{flare} are included in Section D.1.
Measurement methods and procedures	Records of maintenance logs include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates.
Monitoring frequency	Maintenance services in the flare are performed every year by specialized technical service team under conformance with maintenance requirements for the flare (as established by equipment manufacturer) and as required by the ex-ante determined parameter SPEC _{flare} .
QA/QC procedures	The maintenance event logs and documentation for the whole project activity are recorded as per requirement of the company's quality and control (QA/QC) system that is implemented for activities undertaken at the Ecoparque Candeias landfill.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	Status of biogas destruction device
Unit	-
Description	Operational status of biogas destruction devices
Source of data	Operational status of biogas destruction device(s)
Value(s) applied	Not applicable.

Measurement methods and procedures	Records confirming the operational status for the installed high temperature enclosed flare are considered by continuous monitoring of the signal of the UV flame detector installed in the flare during the considered monitoring period, with related monitoring details included under details for the monitoring parameter "Flame detection of flare in the minute m" (Flame_m). The electronic control system for each engine-generator set continuously monitors and reports (via electronic signal) the operational status of each one of the engine-generator sets ("on" for under operation or "off" for not under operation). It is relevant to note that, for the particular case of the installed 20 engine-generator sets, the parameter "Status of biogas destruction device" is monitored on the same basis as the monitoring parameter "Operation of the equipment that consumes the LFG" ($\text{Op}_{j,h}$) (for each individual engine-generator through the sub-parameters $\text{Op}_{\text{engine-1},h}$, $\text{Op}_{\text{engine-2},h}$, $\text{Op}_{\text{engine-3},h}$, (...), $\text{Op}_{\text{engine-20},h}$) as reported in the monthly emission reductions calculation spreadsheets. It is also 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.
Monitoring frequency	Continuous
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS

	project activity are performed in accordance with detailed working instructions.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	TDL_{j,y}
Unit	-
Description	Average technical transmission and distribution losses for grid-sourced electricity consumed by the project activity in year y
Source of data	Applicable default value of consumption of grid-sourced electricity as per Option A of the CDM methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) is selected.
Value(s) applied	20% (for electricity imported by the project activity through the electricity grid the project activity is connected to (TDL _{grid,import,y}))
Measurement methods and procedures	The value for TDL _y is determined for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed GS project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft).
Monitoring frequency	Annually.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.

Purpose of data	Calculation of project emissions.
Additional comment	-

Data / Parameter	TDL_{k,y}
Unit	-
Description	Average technical transmission and distribution losses for providing electricity to the grid in year y
Source of data	Applicable default value as per Option A of the methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0) is selected.
Value(s) applied	3% (for generated electricity exported through the electricity grid the GS project activity is connected to (TDL _{grid,export,y}))
Measurement methods and procedures	The value for TDL _{k,y} is determined for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed GS project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft).
Monitoring frequency	Annually.
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	EF_{grid,CM,y}
Unit	tCO ₂ /MWh
Description	CO ₂ emission factor of the Brazilian grid electricity during the year y
Source of data	Calculations based on parameters described above.
Value(s) applied	For year 2023: 0.1149 For year 2024: 0.1321 For January/2025: 0.0262 For February/2025: 0.0265 For March/2025: 0.0256 For April/2025: 0.0275 For May/2025: 0.0280 For June/2025: 0.0316 For July/2025 0.1525 For August/2025: 0.1585
Measurement methods and procedures	The EF _{grid,CM} is calculated ex-post, as the weighted average of the dispatch data analysis OM (Operating Margin) (monitored ex-post) and the BM (Build margin) (ex-ante determined), as described in B.6.3.
Monitoring frequency	Annual
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
Purpose of data	Calculation of project emissions (due to consumption of grid-sourced electricity by the GS project activity) and baseline emissions (due to the displacement by electricity generated by the project's electricity generation infrastructure of equivalent electricity amount which would otherwise be generated by existing grid-connected power plants within the National Electricity Grid of Brazil and addition of new electricity generation sources).

Additional comment	All data and parameters to determine the grid electricity emission factor, as required by the “Tool to calculate the emission factor for an electricity system” (version 07.0), were included in the monitoring plan.
--------------------	---

SDG 7 and SDG 13:

Data / Parameter	$EG_{PJ,y} = EC_{BL,k,y}$																								
Unit	MWh																								
Description	Amount of electricity generated using LFG by the project activity in year y This parameter is also presented as the SDG 7 Indicator “Total electricity produced: Renewable”																								
Source of data	Continuous measurements of electricity generation are performed by using an appropriate electricity meter.																								
Value(s) applied	Monthly values of electricity generated by the GS project activity during the considered monitoring period are as follows: <table> <tr> <th>Month/Year</th><th>Electricity generation (in MWh)</th></tr> <tr> <td>September/2023 (from 29/09/2023 to 30/09/2023)</td><td>1,008</td></tr> <tr> <td>October/2023</td><td>15,910</td></tr> <tr> <td>November/2023</td><td>15,279</td></tr> <tr> <td>December/2023</td><td>16,193</td></tr> <tr> <td>January/2024</td><td>16,264</td></tr> <tr> <td>February/2024</td><td>15,159</td></tr> <tr> <td>March/2024</td><td>15,933</td></tr> <tr> <td>April/2024</td><td>15,344</td></tr> <tr> <td>May/2024</td><td>15,724</td></tr> <tr> <td>June/2024</td><td>13,855</td></tr> <tr> <td>July/2024</td><td>13,566</td></tr> </table>	Month/Year	Electricity generation (in MWh)	September/2023 (from 29/09/2023 to 30/09/2023)	1,008	October/2023	15,910	November/2023	15,279	December/2023	16,193	January/2024	16,264	February/2024	15,159	March/2024	15,933	April/2024	15,344	May/2024	15,724	June/2024	13,855	July/2024	13,566
Month/Year	Electricity generation (in MWh)																								
September/2023 (from 29/09/2023 to 30/09/2023)	1,008																								
October/2023	15,910																								
November/2023	15,279																								
December/2023	16,193																								
January/2024	16,264																								
February/2024	15,159																								
March/2024	15,933																								
April/2024	15,344																								
May/2024	15,724																								
June/2024	13,855																								
July/2024	13,566																								

	August/2024	13,961	
	September/2024	14,366	
	October/2024	15,541	
	November/2024	14,592	
	December/2024	14,851	
	January/2025	15,002	
	February/2025	12,357	
	March/2025	8,018	
	April/2025	9,537	
	May/2025	4,603	
	June/2025	10,313	
	July/2025	10,501	
	August/2025	9,789	
	Measurement methods and procedures	Electricity meter used for measuring $EG_{PJ,y}$:	
Accuracy		±0.10%	
Manufacturer		SCHNEIDER Electric	
Model		ION 8650	
Serial number		MW1807A325-02	
Calibration frequency		5 years	
Date of performed calibration event		13/11/2018	
Certificate number		CAL005/2018	
Validity of performed calibration event		12/11/2023	
Date of performed calibration event		06/03/2023	
Certificate number		CC-0046-24	
Validity of performed calibration event		05/03/2028	
Monitoring frequency		Continuous measurements of electricity generation are aggregated and reported on a monthly frequency.	

QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions. Calibration events are performed in a frequency as per instrument specifications and/or instrument manufacturer's recommendations. Monitoring equipment/instrument(s) are subject to a regular maintenance and testing regime in accordance to appropriate national / international standards/requirements and/or best practice. Spare instrument(s) may be kept.
Purpose of data	Calculation of baseline emissions (due to the displacement by electricity generated by the project's electricity generation infrastructure of equivalent electricity amount which would otherwise be generated by existing grid-connected power plants within the National Electricity Grid of Brazil and addition of new electricity generation sources).
Additional comment	-

SDG 8:

Data / Parameter	Number of employments
Unit	Number of jobs created by the GS project activity.
Description	Number of employees related to the operation of the GS project activity
Source of data	Employment records
Value(s) applied	20 employees related to the operation of the GS project activity during year 2023 (20 males).

	20 employees related to the operation of the GS project activity during year 2024 (20 males). 20 employees related to the operation of the GS project activity during year 2025 (20 males).
Measurement methods and procedures	In accordance with records of direct employees/collaborators for the operation of the GS project activity.
Monitoring frequency	Annual.
QA/QC procedures	Procedures related to collection/gathering, recording, storing and reporting of monitoring data for the GS project activity are performed in accordance with detailed working instructions.
Purpose of data	-
Additional comment	-

The following monitoring parameters, listed in the registered PDD for the GS project activity are not used/considered for the current monitoring period (due to the selected approaches for determination of baseline calculations):

- $V_{t,wb,j}$: Volumetric flow of LFG stream in time interval t on a wet basis for j (where j is the LFG delivery pipeline to the flare and/or to each engine-generator set).
- $v_{CH_4,t,wb,j}$: Volumetric fraction of CH_4 in the collected LFG in time interval t on a wet basis for j (where j is the LFG delivery pipeline to the flare and/or to each engine-generator set).
- $P_{H_2O,t,Sat}$: Saturation pressure of H_2O at temperature T_t in time interval t

Moreover, since the backup captive off-grid electricity generator (fueled by diesel) installed as part of the GS project activity has not operated during the whole considered monitoring period, the monitoring parameter "Quantity of electricity consumed from diesel generator by the project activity during the year y " ($EC_{PJ,captive,y}$) was also not used/considered for the current monitoring period either.

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
----------------	--	---------------------------------------

Not applicable. The GS project activity is not a Community Service Activity.

D.4. Implementation of sampling plan

>>

Not applicable.

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

>>

SDG 7: Affordable and Clean Energy

No electricity is generated from renewable power in the absence of the GS project activity (baseline scenario).

SDG 8: Decent work and Economic Growth

No direct/indirect jobs are created in the absence of the GS project activity (baseline scenario).

SDG 13: Climate Action

Under conformance with provisions and calculation approaches of the registered GS4GG PDD for the GS project activity, baseline emissions (BE_y) for the GS project activity are determined (in tCO_2e) as follows:

Baseline emissions (BE_y) are determined (in tCO_2e) as follows:

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

Where:

$BE_{CH_4,y}$ Baseline emissions of methane from the SWDS⁸.

$BE_{EC,y}$ Baseline emissions associated with electricity generation in year y (in tCO_2/yr).

⁸ SWDS = Solid Waste Disposal Site. For the particular case of the GS project activity, the SWDS is the Ecoparque Candeias landfill.

Determination of baseline emissions of methane from the SWDS ($BE_{CH_4,y}$):

Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$) are determined as follows:

$BE_{CH_4,y}$ Baseline emissions of methane from the SWDS. As established by both the CDM baseline and monitoring methodology ACM0001 (version 19.0) and the registered GS4GG PDD for the GS project activity, the determination of $BE_{CH_4,y}$ is based on the amount of methane that is actually captured and combusted as part of the GS project activity (through destruction of collected LFG in the flare and/or utilization of collected LFG as gaseous fuel for electricity generation in the engine-generator sets of the project's electricity generation infrastructure). As also established by both ACM0001 (version 19.0) and the registered GS4GG PDD, the amount of methane that would be otherwise captured and destroyed in the Ecoparque Candeias landfill (by pre-project previously existent conventional LFG destruction system) in the absence of the GS project activity (baseline scenario) is also taken into account.

In addition, the effect of methane oxidation (that, as per ACM0001 (version 19.0) is assumed as existing in the baseline and not in the project scenario) is also taken into account.

$BE_{CH_4,y}$ is thus determined as follows:

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

Where:

OX_{top_layer} Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline scenario. OX_{top_layer} is ex-ante determined as 10%. Further details about the selection of the value for OX_{top_layer} is included in Section D.1 and in the registered GS4GG PDD.

$GWP_{CH_4,y}$ Global warming potential of CH_4 . GWP_{CH_4} is ex-ante determined as 28 tCO₂/tCH₄. Further details about the

selection of the value for GWP_{CH_4} is included in Section D.1 and in the registered GS4GG PDD for the GS project activity.

$F_{CH_4,BL,y}$ Amount of methane in the LFG that would be flared in the baseline scenario (absence of project activity).
As outlined in Section B.6.1 of the registered GS4GG PDD for the GS project activity, $F_{CH_4,BL,y}$ is calculated as follows:

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

Where:

$F_{CH_4,PJ,y}$ Amount of methane collected by the project activity. In the particular case of the GS project activity and for the considered monitoring period, while collected LFG was sent for combustion in both the high temperature enclosed flare and in the engine-generator sets of the project's electricity generation infrastructure, $F_{CH_4,PJ,capt,y}$ is thus determined as follows for such period:

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

Where:

$F_{CH_4,EL,y}$ Amount of methane in the LFG which is used for electricity generation in year y (in tCH_4/yr). Details for the determination of every-minute values for $F_{CH_4,EL,y}$ are presented below (under "*Determination of every-minute values for the calculation parameters $F_{CH_4,sent_flare,y}$ and $F_{CH_4,EL,y}$* ").

$F_{CH_4, sent_flare, y}$ Amount of methane in the LFG which is sent to the flare in year y (in tCH_4/yr). Details for the determination of every-minute values for $F_{CH_4, sent_flare, y}$ are presented below (under “*Determination of every-minute values for the calculation parameters $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$* ”).

For the considered monitoring period, the accumulated value for $F_{CH_4, BL, y}$ is calculated and reported as 13,336 tCH_4 . All related calculations are presented in the monthly emission reduction calculation spreadsheets that are enclosed with this Monitoring Report.

$F_{CH_4, PJ, y}$ Amount of methane in the LFG which is flared and/or used in the project activity. In the particular case of the GS project activity, $F_{CH_4, PJ, y}$ is 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 (in tCH_4/yr). Details for the determination of every-minute values for $F_{CH_4, EL, y}$ for each individual engine-generator during the considered monitoring period are presented below (under “*Determination of every-minute values for the calculation parameters $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$* ”).

$F_{CH_4,flared,y}$ Amount of methane in the LFG flared by the project activity (in tCH₄) during the whole monitoring period. In accordance with calculation guidance included in the registered GS4GG PDD and by following applicable guidance of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0), for the flare every-minute values for $F_{CH_4,flared,y}$ are determined as the difference between the amount of methane supplied to the flare and residual methane emissions from combustion of LFG in 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.

Details for the determination of every-minute values for $F_{CH_4,sent_flare,y}$ for each individual flare are presented below (under “*Determination of every-minute values for the calculation parameters $F_{CH_4,sent_flare,y}$ and $F_{CH_4,EL,y}$* ”).

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream. Details for the determination of every-minute values for $PE_{flare,y}$ for each individual flare are presented below (under “*Determination of $PE_{flare,y}$* ”).

Determination of the calculation parameters $F_{CH_4, sent_flare, y}$ and $F_{CH_4, EL, y}$:

For the considered monitoring period, Option A of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) (where the gaseous stream the tool shall be applied to is the stream of collected LFG that is sent to the flare and to the electricity generation infrastructure) is the selected option for determination of values of $F_{CH_4, sent_flare, y}$ (applicable for the flare) and values of $F_{CH_4, EL, y}$ (applicable for the engine-generator sets of the project’s electricity generation infrastructure).

Determination of $F_{CH_4, EL, y}$:

The flow of greenhouse gas i ($F_{i, t}$) ($i = CH_4$) to the set engine-generator sets of the project’s electricity generation infrastructure is determined as follows:

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

Where:

$V_{t, db, engines}$	Volumetric flow of the gaseous stream (LFG) sent to the engine-generator sets in time interval t on a dry basis. For the considered monitoring period, every-minute values of the calculation parameter $V_{t, db, engines}$ are calculated and reported (in Nm ³ dry gas/h) in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to the Monitoring Report).
$v_{i, t, db}$	Volumetric fraction of CH ₄ in the gaseous stream in time interval t on a dry basis. Further monitoring details about the monitoring parameter $v_{i, t, db}$ are included above and in Section D.2.
$\rho_{i, t}$	Density of greenhouse gas i in the gaseous stream in time interval t . The determination approach of $\rho_{i, t}$ during the considered monitoring period is presented above.

During the entire monitoring period, measurements of collected LFG supplied to the engine-generator sets were performed by a single LFG flow meter (under conformance with the alternative and simplified monitoring approach presented in the Option “Use of

a single flow meter for multi-use of recovered biogas” of the Appendix of the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)).

The following applicable additional monitoring requirement specifically for the use of a single or reduced number of LFG flow meters as established in the tool was considered in the context of the determination of $F_{CH_4,EL,y}$ as follows:

It is demonstrated that the engine-generator sets are all designed in such a manner that it is physically impossible for LFG passing through and being directly emitted into the atmosphere while the underlying engine-generator sets are under non-operational status. It is thus ensured/demonstrated that during the whole considered monitoring period, no collected LFG was able to be eventually directly emitted into (vented through) the atmosphere through a non-operational engine-generator set.

For the considered monitoring period, such confirmation was done through the following approaches:

- 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 .

For the considered monitoring period, the accumulated value for $F_{CH_4,EL,y}$ is calculated as 63,366 tCH₄.

Determination of $F_{CH_4,sent_flare,y}$:

The flow of greenhouse gas i ($F_{i,t}$) ($i = CH_4$) for the installed flare during the whole considered monitoring period is determined as follows:

$$F_{CH_4, sent_flare, y} = F_{CH_4, t} = V_{t, db} * v_{i, t, db} * \rho_{i, t}$$

Where:

$V_{t, db}$ Volumetric flow of the gaseous stream in time interval t on a dry basis at normal conditions.

For the considered monitoring period, every-minute values of the calculation parameter $V_{t, db}$ are measured and reported (in Nm³ dry gas/h) in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to this Monitoring Report).

Further monitoring details about the monitoring parameter $V_{t, db}$ are included in Section D.2.

$v_{i, t, db}$ Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis. As per the applied monitoring procedure, every-minute values of the monitoring parameter $v_{i, t, db}$ (in m³ of CH₄ / m³ of dry LFG) are reported in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to this Monitoring Report).

Further monitoring details about the monitoring parameter $v_{i, t, db}$ are included in Section D.2.

$\rho_{i, t}$ Density of greenhouse gas i in the gaseous stream in time interval t . For the considered monitoring period, value of $\rho_{CH_4, n}$ (kg CH₄ / m³ of CH₄) is calculated and reported in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period (and enclosed to this Monitoring Report) as follows:

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

Where:

P_t Absolute pressure of the gaseous stream in time interval t . Further details about the ex-post monitored parameter P_t are included in Section D.2 and in the registered GS4GG PDD.

- T_t Temperature of the gaseous stream in time interval t . Further details about the ex-post monitored parameter T_t are included in Section D.2 and in the registered GS4GG PDD.
- MM_i Molecular mass of greenhouse gas i ($i = \text{CH}_4$). MM_i ($i = \text{CH}_4$) is ex-ante determined as 16.04 kg/mol. Further details about the ex-ante determined parameter MM_i ($i = \text{CH}_4$) are presented in Section D.1 and in the registered GS4GG PDD.
- R_u Universal ideal gases constant. R_u is ex-ante determined as 8,314 Pa.m³ /kmol.K. Further details about the ex-ante determined parameter R_u are presented in Section D.1 and in the registered GS4GG PDD.

$\rho_{\text{CH}_4,n}$ is calculated as 0.7160000 kgCH₄ / m³CH₄ as reported in the monthly emission reduction calculation spreadsheets valid for the considered monitoring period.

Determination of $PE_{\text{flare},y}$:

Project emissions from flaring ($PE_{\text{flare},y}$) is determined for the considered monitoring period by following applicable guidance from the CDM methodological tool “Project emissions from flaring” (version 03.0). While a single high temperature enclosed flare is installed as part of the GS project activity, $PE_{\text{flare},y}$ is determined by following the stepwise approach below:

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

STEP 2: Determination of the flare efficiency

STEP 3: Calculation of project emissions from flaring

Step 1: Determination of the methane mass flow in the residual gas

The “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) shall be used to determine Mass flow of methane in the residual gaseous stream in the minute m .

The following requirements apply:

- The gaseous stream tool shall be applied to the residual gas
- The flow of the gaseous stream shall be measured continuously
- CH₄ is the greenhouse gas i for which the mass flow should be determined
- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the CDM methodological tool); and
- The time interval t for which mass flow should be calculated is every minute m ;

$F_{CH_4,m}$, (which is measured as the mass flow during minute m) shall then be used to determine the mass of methane in kilograms sent to the flare in minute m ($F_{CH_4,RG,m}$). $F_{CH_4,m}$ shall be determined on a dry basis.

The option chosen for the CDM methodological tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) by the project developer is option A.

Step 2: Determination of flare efficiency

Enclosed flare

The registered GS4GG PDD for the GS project activity establishes that in the case of enclosed flares, project developer may choose between the following two options to determine the flare efficiency for minute m ($\eta_{flare,m}$).

Option A: Apply a default value for flare efficiency

Option B: Measure the flare efficiency.

For the considered monitoring period, the flare efficiency ($\eta_{flare,m}$) was determined by following applicable guidance of Option B.2 of the CDM methodological tool “Project emissions from flaring” (version 03.0), where the flare efficiency is measured in an every minute basis as described below:

Option B: Measured flare efficiency

The flare efficiency in the minute m is a measured value ($\eta_{flare,m} = \eta_{flare,calc,m}$) when the following three conditions are met to demonstrate that the flare is operating:

- (1) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m ;
- (2) The flame is detected in minute m ($Flame_m$); and

Otherwise $n_{flare,m}$ is 0%.

In applying Option B, the project developer chose to determine $n_{flare,calc,m}$ using Option B.2 where the measurement of flare efficiency are conducted in each minute.

Option B.2: Measurement of flare efficiency in each minute

The flare efficiency ($\eta_{flare,calc,m}$) is determined based on monitoring the methane content in the exhaust gas, the residual gas, and the air used in the combustion process during the minute m in year y , as follows:

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

Where:

$\eta_{flare,calc,m}$	Flare efficiency in the year y
$F_{CH4,EG,m}$	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the minute m (kg)
$F_{CH4,RG,m}$	Mass flow of methane in the residual gas on a dry basis at reference conditions in the minute m (kg)

$F_{CH4,EG,t}$ is measured according to an appropriate national or international standard. $F_{CH4,RG,t}$ is calculated according to Step 1, and consists of the sum of methane flow in the minutes m that make up the time period t .

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

The mass flow of methane in the exhaust gas is determined based on the volumetric flow of the exhaust gas and the measured concentration of methane in the exhaust gas, as follows:

$$F_{CH_4,EG,m} = V_{EG,m} * f_{CH_4,EG,m} * 10^{-6}$$

Where:

$F_{CH_4,EG,m}$ Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the minute m (kg)

$V_{EG,m}$ Volumetric flow of the exhaust gas of the flare on a dry basis at reference conditions in minute m (m³)

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

The average volume flow of the exhaust gas in minute m is determined based on a stoichiometric calculation of the combustion process. This depends on the chemical composition of the residual gas, the amount of air supplied to combust it and the composition of the exhaust gas. It is calculated as follows:

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

Where:

$V_{EG,m}$ Volumetric flow of the exhaust gas of the flare on a dry basis at reference conditions in minute m (m³)

$Q_{EG,m}$ Volume of the exhaust gas on a dry basis at reference conditions per kilogram of residual gas on a dry basis at reference conditions in minute m (m³ exhaust gas/kg residual gas)

$M_{RG,m}$ Mass flow of the residual gas on a dry basis at reference conditions in the minute m (kg)

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

Project developer may select to monitor the mass flow of the residual gas in minute m directly (see monitored parameter $M_{RG,m}$) or, according to the procedure given in this step, calculate $M_{RG,m}$ based on the volumetric flow and the

density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas.

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

Where:

$M_{RG,m}$ Mass flow of the residual gas on a dry basis at reference conditions in the minute m (kg)

$V_{RG,m}$ Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m (m³)

$\rho_{RG,ref,m}$ Density of the residual gas at reference conditions in minute m (kg/m³)

Where:

$$\rho_{RG,ref,m} = P_{ref} / ((R_u / MM_{RG,m}) * T_{Ref})$$

$\rho_{RG,ref,m}$ Density of the residual gas at reference conditions in minute m (kg/m³)

P_{ref} Atmospheric pressure at reference conditions (Pa). Further details about the selection of the value for GWP_{CH4} is included in Section D.1 and in the registered GS4GG PDD for the GS project activity.

R_u Universal ideal gas constant (Pa.m³/kmol.K)

T_{ref} Temperature at reference conditions (K). Further details about the selection of the value for GWP_{CH4} is included in Section D.1 and in the registered GS4GG PDD for the GS project activity.

$MM_{RG,m}$ Molecular mass of the residual gas in minute m (kg/kmol). Use the equation below to calculate $MM_{RG,m}$. When applying this equation, project developer may choose to either a) use the measured volumetric fraction of each component i of the residual gas, or b) as a simplification, measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N_2). The same equation applies, irrespective of which option is selected. Calculated as follows:

$$MM_{RG,m} = \sum (V_{i,RG,m} * MM_i)$$

Where:

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

MM_i Molecular mass of residual gas component i (kg/kmol)

$V_{i,RG,m}$ Volumetric fraction of component i in the residual gas on a dry basis at reference conditions in the hour h

i Components of the residual gas. If Option (a) is selected to measure the volumetric fraction, then $i = CH_4, CO, CO_2, O_2, H_2, H_2S, NH_3, N_2$ or if Option (b) is selected then $i = CH_4$ and N_2

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

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

Where:

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

$$Q_{CO_2,EG,m} = (MF_{C,RG,m} / AM_C) * VM_{ref}$$

Where:

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

AM_C Atomic mass of carbon (kg/kmol)

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

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

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

Where:

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

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

Where:

$V_{O_2,EG,m}$	Volumetric fraction of O ₂ in the exhaust gas on a dry basis at reference conditions in the minute m $m v_{O_2,air}$ = Volumetric fraction of O ₂ in the air
$v_{O_2,air}$	Volumetric fraction of O ₂ in the air
$MF_{C,RG,m}$	Mass fraction of carbon in the residual gas in the minute m
AM_C	Atomic mass of carbon (kg/kmol)
$MF_{N,RG,m}$	Mass fraction of nitrogen in the residual gas in the minute m
AM_N	Atomic mass of nitrogen (kg/kmol)
$F_{O_2,RG,m}$	Stoichiometric quantity of moles of O ₂ required for a complete oxidation of one kg residual gas in minute m (kmol/kg residual gas). Calculated as follows:

$$F_{O_2,RG,m} = (MF_{C,RG,m} / AM_C) + (MF_{H,RG,m} / 4 * AM_H) - (MF_{O,RG,m} / 2 * AM_O)$$

Where:

$MF_{C,RG,m}$	Mass fraction of carbon in the residual gas in the minute m
AM_C	Atomic mass of carbon (kg/kmol)
$MF_{H,RG,m}$	Mass fraction of hydrogen in the residual gas in the minute m
AM_H	Atomic mass of hydrogen (kg/kmol)

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

AM_O Atomic mass of oxygen (kg/kmol)

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

$Q_{N2,EG,m}$ Quantity of N_2 volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m^3 /kg residual gas). Calculated as follows:

$$Q_{N2,EG,m} = VM_{ref} * \{(M_{FN,EG,m}/2*AM_N) + ((1-V_{O2,air})/V_{O2,air})*[F_{O2,RG,m} + n_{O2,EG,m}]\}$$

Where:

$Q_{N2,EG,m}$ Quantity of N_2 (volume) in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m^3 /kg residual gas)

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

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

AM_N Atomic mass of nitrogen (kg/kmol)

$V_{O2,ai}$ Volumetric fraction of O_2 in air

$F_{O2,RG,m}$ Stoichiometric quantity of moles of O_2 required for a complete oxidation of one kg residual gas in minute m (kmol/kg residual gas)

$n_{O2,EG,m}$ Quantity of O_2 (moles) in the exhaust gas per kg of residual gas flared on a dry basis at reference conditions in minute m (kmol/kg residual gas). Calculated as follows:

The mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas is determined by using the volumetric fraction of component i in the residual gas and applying the equation below. Under conformance with Option (b) of the CDM methodological tool "Project emissions from flaring gases containing methane", the volumetric fraction of methane was measured and the difference to 100% was considered as being nitrogen (N₂).

$$MF_{j,RG,m} = \sum v_{i,RG,m} * AM_j * NA_{j,i} / MM_{RG,m}$$

Where:

$MF_{j,RG,m}$	Mass fraction of element j in the residual gas in the minute m
$v_{i,RG,m}$	Volumetric fraction of component i in the residual gas on a dry basis in the minute m
AM_j	Atomic mass of element j (kg/kmol)
$NA_{j,i}$	Number of atoms of element j in component i
$MM_{RG,m}$	Molecular mass of the residual gas in minute m (kg/kmol)
j	Elements C, O, H and N
i	Component of residual gas. If Option (a) is selected to measure the volumetric fraction, then $i = CH_4, CO, CO_2, O_2, H_2, H_2S, NH_3, N_2$ or if Option (b) is selected then $i = CH_4$ and N_2

Step 3: Calculation of project emissions from flaring

For the considered monitoring period, project emissions from flaring are calculated as the sum of emissions for each minute m in year y , based on the methane mass flow in the residual gas ($F_{CH_4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows:

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

Where:

$PE_{\text{flare},y}$ Project emissions from flaring of the residual gas in year y (tCO₂e)

GWP_{CH_4} Global warming potential of methane valid for the commitment period (tCO₂e/tCH₄)

$F_{\text{CH}_4,\text{RG},m}$ Mass flow of methane in the residual gas in the minute m (kg)

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

For the considered monitoring period, the accumulated value for $F_{\text{CH}_4,\text{flared},y}$ is calculated as 3,288 tCH₄.

Determination of baseline emissions associated with electricity generation ($BE_{\text{EC},y}$)

Baseline emissions associated with electricity generation ($BE_{\text{EC},y}$) are determined as follows for the considered monitoring period:

$$BE_{\text{EC},y} = EC_{\text{BL},y} * EF_{\text{EL},\text{grid},y} * (1 + \text{TDL}_{\text{grid},y})$$

Where:

$EC_{\text{BL},y}$ Amount of electricity generated using LFG in year y (in MWh) ($EG_{\text{PJ},y}$). As per the applied monitoring procedure, monthly records of net electricity generated by the GS project activity (using collected LFG as gaseous fuel) for the considered monitoring period are summarized below:

Month/Year	Net-amount of electricity generated using LFG (MWh)
September/2023 (from 29/09/2023 to 30/09/2023)	1,008
October/2023	15,910
November/2023	15,279
December/2023	16,193

January/2024	16,264
February/2024	15,159
March/2024	15,933
April/2024	15,344
May/2024	15,724
June/2024	13,855
July/2024	13,566
August/2024	13,961
September/2024	14,366
October/2024	15,541
November/2024	14,592
December/2024	14,851
January/2025	15,002
February/2025	12,357
March/2025	8,018
April/2025	9,537
May/2025	4,603
June/2025	10,313
July/2025	10,501
August/2025	9,789

The total amount of electricity generated by the GS project activity during the considered monitoring period was 307,666 MWh. Additional monitoring details about the monitoring parameter $EG_{PJ,y}$ are included in Section D.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. Additional monitoring details about the monitoring parameter $TDL_{grid,y}$ are included in Section D.2.

$EF_{EL,grid,y}$ Emission factor for grid sourced electricity in year y (in tCO_2/MWh). $EF_{EL,grid,y}$ is determined as the combined margin emission factor ($EF_{grid,CM,y}$) that is calculated as the weighted average of the operating margin and build margin emission factors. To weigh these two factors, the default values of w_{OM} and w_{BM} are applicable to both for the GS crediting period are applied. The combined margin emission factor is thus obtained as follows:

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

Where:

w_{OM} Weighting of operating margin emissions factor. w_{OM} is ex-ante selected as 0.25.

w_{BM} Weighting of operating margin emissions factor. w_{BM} is ex-ante selected as 0.75.

$EF_{grid,OM,y}$ Operating margin CO₂ emission factor in year y (in tCO₂/MWh). $EF_{grid,OM,y}$ is ex-post determined as

Month/Year	$EF_{grid,OM,y}$ (tCO ₂ /MWh)
2023	0.3786
2024	0.4473
January/2025	0.0237
February/2025	0.0248
March/2025	0.0215
April/2025	0.0289
May/2025	0.0309
June/2025	0.0455
July/2025	0.5290
August/2025	0.5530

The selected value for the monitoring parameter $EF_{grid,OM,y}$ represents the official value as calculated and published by the DNA of Brazil. Further details about the monitoring parameter $EF_{grid,OM,y}$ are included in Section D.2.

$EF_{grid,BM,y}$ Build margin CO₂ emission factor in year y . $EF_{grid,BM}$ is ex-ante determined as 0.0270 tCO₂/MWh. Further details about the ex-ante determined parameter $EF_{grid,BM}$ are included in Section D.1.

As outlined in the summarized emission reduction calculation spreadsheet which is also enclosed to this Monitoring Report, for the considered monitoring period, $EF_{grid,CM,y}$ is calculated as follows:

Month/Year	$EF_{grid,CM,y}$ (tCO ₂ /MWh)
2023	0.1149
2024	0.1321
January/2025	0.0262
February/2025	0.0265
March/2025	0.0256
April/2025	0.0275
May/2025	0.0280
June/2025	0.0316
July/2025	0.1525
August/2025	0.1585

Baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) for the considered monitoring period are calculated and reported as 35,030 tCO₂. Total baseline emissions (BE_y) for the considered monitoring period were calculated as 1,341,291 tCO₂e. All related calculations are presented in the emission reduction calculation spreadsheets that are enclosed with the Monitoring Report.

E.2. Calculation of project value or estimation of project situation of each SDG Impact

>>

SDG 7: Affordable and Clean Energy

Under conformance with provisions and calculation approaches of the PDD, electricity generated by the GS project activity (in MWh) is measured by an appropriate electricity meter and the accumulated value for the considered monitoring is determined as 307,666 MWh.

SDG 8: Decent work and Economic Growth

20 employees were involved in the operation of the GS project during the monitoring period from 29/09/2023 to 31/08/2025.

SDG 13: Climate Action

During the considered monitoring period, as the installed backup captive off-grid electricity generator (fueled by diesel) has not operated, the only project emissions for the GS project activity are the emissions associated with the consumption of grid-sourced electricity ($PE_{EC,y}$).

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

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

Where:

PE_y Project emissions in year y (tCO_2/yr)

$PE_{EC,y}$ Emissions from consumption of electricity due to the project activity in year y (tCO_2/yr)

Calculation of $PE_{EC,y}$ – project emission from consumption of electricity

Project emissions due to the consumption of grid-sourced electricity by the GS project activity ($PE_{EC,grid,y} = PE_{EC1,y}$) are calculated as per the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” as follows:

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

Where:

$TDL_{grid,y}$ Average technical transmission and distribution losses for grid sourced electricity consumed by the project activity in year y . $TDL_{grid,y}$ is ex-ante selected as 20%. Further details about $TDL_{grid,y}$ are included in Section D.2.

$EC_{PJ,1,y}$ Quantity of grid sourced electricity consumed by the project activity in year y (in MWh). As per the applied monitoring procedure, monthly records of grid-sourced electricity consumption valid for the considered monitoring period are summarized below:

Month/Year	Amount of grid-sourced electricity consumed by the GS project activity (MWh) ⁹
September/2023 (from 29/09/2023 to 30/09/2023)	0
October/2023	0.164
November/2023	0
December/2023	0
January/2024	0
February/2024	0
March/2024	0
April/2024	1.831
May/2024	0.216
June/2024	0.269
July/2024	0.998
August/2024	0.379
September/2024	0

⁹ Since the electricity demand of the GS project activity is provided by its own electricity generation component, during several months of the considered monitoring period there was no verified consumption of grid electricity.

October/2024	0.230
November/2024	0.889
December/2024	0.630
January/2025	0.258
February/2025	0.245
March/2025	26.653
April/2025	2.838
May/2025	0.092
June/2025	0.265
July/2025	0.406
August/2025	4.803

Additional monitoring details about the monitoring parameter $EC_{PJ1,y}$ are included in Section D.2.

$EF_{EL,grid,y}$ Emission factor for grid sourced electricity in year y (in tCO_2/MWh). $EF_{EL,grid,y}$ is determined as the combined margin emission factor ($EF_{grid,CM,y}$) that is calculated as the weighted average of the operating margin and build margin emission factors. To weigh these two factors, the default values applicable for the GS crediting period are applied. The combined margin emission factor is thus obtained as follows:

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

Where:

- w_{OM}
Weighting of operating margin emissions factor. w_{OM} is ex-ante selected as 0.25.
- w_{BM}
Weighting of operating margin emissions factor. w_{BM} is ex-ante selected as 0.75.
- $EF_{grid,OM,y}$
Operating margin CO_2 emission factor in year y (in tCO_2/MWh). $EF_{grid,OM,y}$ is ex-post determined as:

Month/Year	$EF_{grid,OM,y}$ (tCO_2/MWh)
2023	0.3786

2024	0.4473
January/2025	0.0237
February/2025	0.0248
March/2025	0.0215
April/2025	0.0289
May/2025	0.0309
June/2025	0.0455
July/2025	0.5290
August/2025	0.5530

The selected value for the monitoring parameter $EF_{grid,OM,y}$ represents the official value as calculated and published by the DNA of Brazil. Further details about the monitoring parameter $EF_{grid,OM,y}$ are included in Section D.2.

$EF_{grid,BM,y}$ Build margin CO₂ emission factor in year y . $EF_{grid,BM}$ is ex-ante determined as 0.0270 tCO₂/MWh. Further details about the ex-ante determined parameter $EF_{grid,BM}$ are included in Section D.1.

As outlined in the summarized emission reduction calculation spreadsheet which is also enclosed with this Monitoring Report, for the considered monitoring period, $EF_{grid,CM,y}$ is calculated as follows

Month/Year	$EF_{grid,CM,y}$ (tCO ₂ /MWh)
2023	0.1149
2024	0.1321
January/2025	0.0262
February/2025	0.0265
March/2025	0.0256
April/2025	0.0275
May/2025	0.0280
June/2025	0.0316
July/2025	0.1525
August/2025	0.1585

For the considered monitoring period, project emissions due to the consumption of grid-sourced electricity by the GS project activity ($PE_{EC1,y}$) are thus calculated as 17 tCO₂ (rounded value).

The summarized emission reduction calculation spreadsheet (that is enclosed to this Monitoring Report) includes all calculations related to the determination of $PE_{EC1,y}$ for the considered monitoring period.

E.3. Calculation of leakage

>>

In accordance with the ACM0001 (version 19.0), no leakage effects need to be accounted for.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
7	Affordable and Clean Energy	-	307,666 MWh	307,666 MWh
8	Decent work and Economic Growth	-	20 jobs/year	20 jobs/year
13	Climate Action	-	1,341,274 tCO ₂ e	1,341,274 tCO ₂ e

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values achieved during this monitoring period
7	432,455 MWh	307,666 MWh
8	21 jobs/year	20 jobs/year
13	879,836 tCO ₂ e	1,341,274 tCO ₂ e

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved GS4GG PDD for the GS project activity for this monitoring period

>>

SDG 7: Affordable and Clean Energy

The value of 432,455 MWh is calculated as the sum of the previously estimated values for ex-ante estimation of electricity to be generated by the project activity during the

years of 2023 (considering the period from 29/09/2023 to 31/12/2023), 2024 and 2025 (considering the period from 01/01/2025 to 31/08/2025).

SDG 8: Decent work and Economic Growth

The average number of jobs previously estimated (21 jobs) in the registered GS4GG PDD is calculated as the average of jobs during the years of 2023, 2024 and 2025.

SDG 13: Climate Action

The 879,836 tCO₂e value is calculated as the sum of the ex-ante estimated emission reductions to be achieved by the project activity during the years of 2023 (considering the period from 29/09/2023 to 31/12/2023), 2024 and 2025 (considering the period from 01/01/2025 to 31/08/2025).

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

>>

SDG 7: Affordable and Clean Energy

Electricity generated by the GS project activity during the considered monitoring period represents about ~71% of the calculated value of ex-ante estimation of electricity generation valid/applicable for the same period as per annual estimates included in the registered GS4GG PDD for the GS project activity.

In the context of the estimation of electricity generated as seen in the registered GS4GG PDD, it is assumed that the electricity generation facility is operating 24 hours a day and considering the maximum installed capacity, however it is known that in reality these operation conditions does not reflect the scenario during the considered monitoring period (due to stops for maintenance events and also issues in the electricity grid).

SDG 8: Decent work and Economic Growth

Not applicable.

SDG 13: Climate Action

GHG emission reductions achieved by the GS project activity during the considered monitoring period represent about ~152% of the calculated value of ex-ante estimation of emission reductions valid/applicable for the same period as per annual estimates included in the registered GS4GG PDD for the GS project activity.

Uncertainties associated with the application of First Order Decay (FOD) multi-phased model for estimating the emission reductions in the PDD:

Like other similar project activities encompassing LFG collection and destruction/utilization, the amount of methane to be generated by decomposition of MSW disposed at the Ecoparque Candeias landfill and collected by the GS project activity was derived by applying the First Order Decay (FOD) model as per the CDM methodological tool “Emissions from Solid Waste Disposal Sites” (version 08.0) in the context of the determination of ex-ante estimated emission reductions to be achieved by the GS project activity. By taking into account all potential uncertainties associated with the application of such multi-phased decay model, it is reasonable to assume that, in the particular case of the GS project activity during the considered monitoring period, the application of this model somehow underestimated the amount of LFG to be actually generated and collected by the GS project activity.

Change in the value of the ex-ante determined parameter Efficiency of the LFG capture system installed in the GS project activity (η_{PJ}) in the GS4GG PDD valid for the project’s 2nd crediting period under the GS4GG:

During the Design Certification Renewal process, a comment was raised by the GS4GG’s Reviewer requesting the value of the efficiency of the LFG capture system installed in the GS project activity (parameter η_{PJ}) to be changed in accordance with technical specifications of the LFG capture system to be installed (if available) or a default value of 50%. While the responses from the project developer justifying the previously adopted value were not accepted during the initial 2 rounds of review, a value of 50% was finally adopted for the parameter η_{PJ} during the 3rd round of review. Consequently, the ex-ante determined values of emission reductions to be achieved by the project activity were significantly reduced in the GS4GG PDD.

SECTION F. SAFEGUARDS REPORTING

>>

Principles	Mitigation Measures added to the Monitoring Plan
Principle 6.1 Labour Rights	Refer to the monitoring parameter “Total number of jobs” in Section D.2.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

>>

The project developer Orizon Valorização de Resíduos S.A. has kept an open channel of communication through its website (<https://www.orizonbrasil.com.br/contato.html>) and also through a phone number which is made available to local communities. All contacts received (including complains, suggestions or enquiries) are forwarded to the respective responsible department (e.g. operational staff of the landfill, operational staff of the GS project activity (e.g. electricity generation infrastructure), etc.) who then becomes responsible for giving a feedback to such contact.

A grievance expression book is also being made available to visitors at the main office of the Ecoparque Candeias landfill for registering any complaints/suggestions regarding the GS project activity.

Nevertheless, since the implementation of the GS project activity, the project developer Orizon Valorização de Resíduos S.A. has not received any complaints or comments regarding the implementation and operation neither of the Ecoparque Candeias landfill nor the GS project activity. Moreover, no legal, regulatory and/or commercial disputes have arisen during the considered monitoring period.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

>>

Not applicable. No comments/suggestions were received regarding the implementation and operation of the Ecoparque Candeias landfill nor the GS project activity.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

>>

Not applicable. No legal contests regarding the implementation and operation of the Ecoparque Candeias landfill nor the GS project activity.

APPENDIX 1. DECLARATION FROM THE PROJECT DEVELOPER
CONFIRMING THAT THE GS PROJECT ACTIVITY WILL NOT ISSUE
BOTH CERTIFIED EMISSION REDUCTION (CERs) UNDER THE CDM
(AND/OR OTHER COMPLIANCE UNIT UNDER THE PARIS
AGREEMENT) JOINTLY WITH GS VER FOR THE SAME VINTAGE (FOR
THE CONSIDERED AND ALSO FOR FUTURE MONITORING PERIODS
WITHIN THE GS4GG)

To whom it may concern,

As the developer, owner and operator of the GS project activity
"Ecoparque Candeias Landfill Gas Project" (ID GS12047), Orizon
Valorização de Resíduos S.A. declares that no Certified Emission
Reductions (CERs), and/or other compliance or voluntary units under
the Paris Agreement or any voluntary carbon standard/scheme will be
requested/issued for the same vintage as the present monitoring
period (from 29/09/2023 to 31/08/2025) nor for future monitoring
periods for which GS VERs will be issued.

We also agree to comply with all future UNFCCC COP/CMP decisions,
including adjustment of GWP values.

DocuSigned by:

7238A375522C46E

Dalton Canelhas
Operational Director

10/11/2025 | 12:38 BRT

APPENDIX 2. REMAINING FAR FROM VALIDATION AND/OR PREVIOUS VERIFICATIONS

The following FARs were previously raised during the validation for the successfully occurred transition of the project activity from the UNFCCC's Clean Development Mechanism (CDM) to Gold Standard for Global Goals (GS4GG):

"FAR 01: 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."

Consideration/addressing of the raised FAR:

A declaration confirming that the GS project activity will not jointly claim/issue CDM CERs (and/or other compliance GHG emission reduction units under the Paris Agreement) and GS VER for the same vintage (for the considered monitoring period and also for future monitoring periods under GS4GG) is included in Appendix 1 of the Monitoring Report.

"FAR 02: Projects transitioning to the GS4GG are required to demonstrate Ongoing Financial Need (OFN) as per the relevant GS4GG rules and requirements available at the time of renewal of crediting period. Project developer shall demonstrate OFN during the crediting period renewal submission."

Consideration/addressing of the raised FAR:

This FAR was addressed as part of the renewal of crediting period (design certification renewal) of the GS project activity under GS4GG.

"FAR 03: 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.”

Consideration/addressing of the raised FAR:

While a site visit (on-site inspection) was conducted on 16/05/2023 by the VVB in charge of performing the 1st Performance Certification for the GS project activity under the GS4GG, no site visit was required to be performed in the context of the 2nd monitoring period vis-à-vis the required every three-year minimum frequency for conduction of site visits (on-site inspections) by appointed VVBs.

“FAR 04: 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.”

Consideration/addressing of the raised FAR:

The Annual Reports for the years of 2021, 2022 and 2023 were completed and were previously submitted as part of the performance review for the 1st monitoring period of the project activity under the GS4GG.

As the date of Design Certification for the project activity was defined as 15/10/2023, the deadline related to the Performance Certification of the quoted requirement is 15/10/2025. It is also relevant to note that an initial Performance Certification was already conducted jointly with the transition of the project activity from the CDM to the GS4GG.

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption