

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

PUBLICATION DATE **29.06.2023**

VERSION **v.1.5**

RELATED SUPPORT

- [TEMPLATE GUIDE Key Project Information & Project Design Document](#)

This document contains the following sections

SECTION A. DESCRIPTION OF PROJECT

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES)
AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

SECTION C. DURATION AND CREDITING PERIOD

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE
ASSESSMENT

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

Appendix 1 - Safeguarding Principles Assessment (mandatory)

Appendix 2 - Contact information of project developer(s) (mandatory)

Appendix 3 - LUF Additional Information (project specific)

Appendix 4 - Design Changes

KEY PROJECT INFORMATION

GS ID of Project	GS12062
Title of Project	CTL Landfill Gas Project
Time of First Submission Date	20/01/2023
Date of Design Certification	02/11/2023
Version number of the PDD	18
Completion date of version	20/11/2025
Project Developer	BENG Engenharia Ltda.
Project Representative	Mr. Cesar Urien
Project Participants and any communities involved	EcoUrbis Ambiental S.A
Host Country (ies)	Brazil
Activity Requirements applied	☐ Community Service Activity ☒ Renewable Energy ☐ Land-Use and Forests Activity Requirements /Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☐ Small Scale ☒ Large Scale
Other Requirements applied	N/A
Methodology (ies) applied and version number	ACM0001: Flaring or use of landfill gas (version 19.0)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☐ Regular ☒ Retroactive

Land-use & Forest Key Project Information¹

Not applicable

Table 1 – Estimated Sustainable Development Contributions

SUSTAINABLE DEVELOPMENT GOALS TARGETED	SDG IMPACT (DEFINED IN B.6)	ESTIMATED ANNUAL AVERAGE	UNITS OR PRODUCTS
13 Climate Action (mandatory)	Yearly emission reduction	1,042,542	tCO ₂ e/year
4 Quality Education	Number of people from local community attending company's socioenvironmental activities events. Based on monthly attendance list and/or monthly activities reports	At 30 people attending events. Based on monthly attendance list and/or monthly activities reports	Participants/ year
5 Gender Equality	Quantity of women in managerial positions	At least one woman in leadership and decision-making positions by showing signed company functional organizational chart in the determined year.	Women in managerial positions
7 Affordable and Clean Energy	Amount of methane selling to costumers through dedicated pipeline	61,565,362	Nm ³ of methane selling/year
8 Decent Work and Economic Growth	Total jobs generated as a result of the project.	At least 10 jobs in the determined year.	Jobs/year

¹ Please refer to Appendix 3 for detailed information on LUF projects

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

>>

The proposed project activity has the objective to capture and to flare/combustion the landfill gas² produced in the new³ landfill called, “*Central de Tratamento de Resíduos Leste – CTL*” located in the city of São Paulo (in the state of São Paulo), Brazil.

The project activity results in greenhouse gas (GHG) emission reduction from the CTL landfill through the ways below:

- Burning CH₄ in flares;
- Supply consumers through a dedicated pipeline.

Prior to the implementation of the project activity the landfill gas was released to atmosphere.

² The major landfill gas contents are methane (CH₄) and carbon dioxide (CO₂).

³ Due to the Post Registration Changes, it is important to highlight that at the time of the registration of the original PDD (registered 27th July 2012), CTL Landfill was defined as new in the PDD by the reason of the closure of São João Landfill, located in a neighboring area where CTL Landfill is currently located and responsible for the waste disposal of solid waste in region East and South of the city of São Paulo.

CTL Landfill began its operation on 24 November 2010 and was designed with a passive LFG collection and open flaring system (at the top of the vertical draining wells). In order to meet with the landfill operation geotechnical, environmental and safety conditions according to the EIA/RIMA approved by the Environmental Agency CETESB (Companhia Ambiental do Estado de São Paulo). With the approval of the EIA/RIMA, CTL landfill received from CETESB the Operational License no. 30006398, process number 30/00847/08, issued on 23/11/2010 and valid until 23/11/2015. Regarding the environmental license from the landfill area expansion, a new Operational License has been issued by CETESB, no 30010065, process number 30/00847/08, issued on 26/02/2016 and valid until 26/02/2021. Currently, the landfill count on an updated operational license 30012899 issued on 09/04/2021 and valid until 09/04/2026. Thus, besides being defined as new landfill in the PDD, CTL Landfill already had an existing passive LFG capture system at the start of its operation but not an existing active LFG capture system and flaring as the project activity.

The project activity includes capture and burn the landfill gas (LFG) in enclosed flares as well as the supply LFG to consumers through a dedicated pipeline.

LFG capture and flare the landfill gas (LFG) in enclosed flares	Operational since 2012
Supply LFG to consumers through a dedicated pipeline	Operational since 2014

The landfill began its operation on 24 November 2010, receiving of household waste (Class II-A and II-B). The increased area of the landfill is 704,106 m² incorporated to the existent landfill area of 1,123,590 m². Thus, the total landfill area considering the increased area is 1,827,696 m². Currently, the landfill count on an updated operational license 30012899 issued on 09/04/2021 and valid until 09/04/2026. The landfill area was updated by the operational license mentioned above, totalizing 1,712,837 m². There is the possibility of increasing the waste disposal area, however this possibility will be analyzed in the future.

In order to guarantee an efficient LFG capture and maximum quality, compaction and sanitary coverage of waste are carried out daily as well as connection of vertical drains. When operationally feasible, LFG is captured from the drains near to the waste discharge front and the quality of LFG flow is monitored. Also, continuous adjustments are carried out for the collection drains and the field is monitoring by specialized consultants.

Landfill gas (LFG) capture and burn in enclosed flares

The project was the construction an efficient capture, collection and flaring system to burn CH₄ (a greenhouse gas) in enclosed flares. These actions reduce odours and adverse environmental impacts.

Important milestones achieved: LFG capture and flare the landfill gas (LFG) in enclosed flares

- **LFG Capture and Flaring:** The Biogas Burning Station - EQB at CTL was implemented with the objective of promoting the complete combustion of methane gas (CH₄) produced in the decomposition of waste, transforming it into carbon dioxide (CO₂) and water (H₂O). EQB's Installation License n° 30004335 was issued by CETESB (Environmental Company of the State of São Paulo) on May 25th, 2012, and in July 2012, the process of capture and centralized burning of LFG produced at CTL was registered as a CDM (Clean Development Mechanism) project by the Executive Committee of the UNFCCC - United Nations Framework Convention on Climate Change on May 8th, 2012. EQB received the Operation License n° 30008288 on 27/03/2013 and in April 2013, it started its operation from the centralized burning of LFG in the enclosed flares. It currently operates under LO n° 30012899 (valid until 09/04/2026) which is the LO for the whole landfill.

Supply LFG to consumers through a dedicated pipeline

Ecourbis Ambiental S.A. stated to inject part of its collected LFG (approximately 78%) to consumer 1 in 2014.

The LFG capture and collection systems and flaring station are consisted on a LFG pipeline grid and a flaring station, equipped with flares, centrifugal blower(s), and all other supporting mechanical and electrical subsystems and appurtenances necessary to run the system. The supplying of LFG to the consumers⁴ is made using a dedicated pipeline connecting CTL LFG plant to consumers, guaranteeing the high efficiency

⁴ According to the Termo of Agreement issued and signed by Ecourbis and SJEA on 31th July 2015, item 1.6. – The CERs from LFG produced at CTL Landfill are exclusive propriety of Ecourbis Ambiental.

combustion of the LFG for energy purposes and also honouring the LFG Purchase and Sale Agreements with the consumers. It is important to highlight that in case any of the LFG consumers presents operational problems, the LFG flow to the dedicated pipelines is automatically closed and no LFG venting to atmosphere will occur, since the LFG will be burn in enclosed flares in LFG Burning Station (EQB) at CTL.

- LFG supply to consumer 1 (SJEA): Since April 28th, 2014
- LFG supply to consumer 2 (FSL/ZEG⁵): Since March 1st, 2019
- LFG supply to consumer 3 (METAGAS): Since April 12th, 2024

- **Beginning of the Special Purpose Entity (SPE):** EcoUrbis Ambiental S/A won the concession to perform the collection, transport, treatment, and final disposal of Municipal Solid Waste (MSW) and of Health Services in the Southeast Grouping of the Municipality of São Paulo, contract number 026/SSO/04 was signed on October 6th, 2004.

- **Environmental Licenses:** CTL received Operating License no. 30006398, issued by CETESB (Environmental Company of the State of São Paulo), on 23/11/2010, having been replaced on 03/06/2011 by Operating License no. 30006740. On 21/10/2014, Operating License no. 30009404 was issued for phases 6 and 7 of the East Waste Treatment Plant - CTL.

The LFG Burning Station (EQB) received from CETESB the Operation License no. 30008288 on 27/03/2013.

Environmental Licenses: The LFG Burning Station (EQB) received from CETESB the renewed Operation License on 22/03/2018 by issuing the Operation License no. 30011270.

The Expansion of the East Waste Treatment Plant - CTL received Operation License no. 30010065 issued on 26/02/2016 by CETESB, for all the expansion phases of the landfill.

On 28/10/2016, the Renewal of the Operation License No. 30010470 referring to the first licensing of CTL was received.

On 09/04/2021, Operating License No. 30012899 was issued, currently in effect, as a result of the Application for Renewal of Operating Licenses nº 30010065 (CTL Expansion) and nº 30010470 (CTL). Operating License nº. 30012899 encompasses all the support structures of the Waste Treatment Center East - CTL, including the LFG Burning Station (EQB).

Important milestones achieved: Supply LFG to consumers through a dedicated pipeline

- Gold Standard Stakeholder Consultation: The public consultation meeting was held on December 12th, 2022, at CTL's Auditorium, attended by 45 participants from the community surrounding CTL, community leaders, government representatives, teachers from educational institutions, among other entities and stakeholders. The invitations were sent by e-mail to the participants 30 days in advance, and the invitation was published in the regional newspaper "O Estado de São Paulo" on 11/11/2022.

- Inclusion of the CTL Landfill Gas Project in the SustainCert pipeline: In January 2023, the submission of documents to SustainCERT to assess the project's eligibility for registration and issuance of GS VERs was initiated.

- Project Registration in Gold Standard, Design Certification Date occurred on 02/11/2023
- Design Change Review no. 1 (removing the LFG electricity generation plant), occurred on 15/04/2025

This project activity is not registered with any other voluntary or compliance schemes and will not claim credits in any other schemes. Also, the CDM project will remain active once met the Gold Standard registration.

Project Activity Ownership and Compliance

EcoUrbis Ambiental S.A.⁶ is the company responsible for the implementation and operation of the CTL landfill and, also, it is responsible, since October/2004, for collection services and disposal of solid waste in region East and South of the city of São Paulo (covering around 6,000,000 of inhabitants) under a concession for twenty years, renewable for another twenty years. On June 13th, 2024, the concession was renewal, and it is valid up to October 12th, 2044.

EcoUrbis Ambiental S.A. also counts on a code of ethics an implemented compliance system and policies such as (instituted in 2016):

- Anti-Corruption Policy;
- Policy on Gifts and Entertainment;
- Supplier Hiring Policy;
- Donation and Sponsorship Policy;
- Partnership Policy.

Regarding Host Country's legal, environmental, ecological and social regulations, the project activity is compliance since it was audited by audit company (DOE) accredited in the UNFCCC during the years 2018, 2019 and 2020 and also for Carbon Credits selling to the World Bank, considering Environmental, Health and Safety (EHS) aspects, being the last EHS Report prepared in 2021.

CTL operates in compliance with the environmental legislation of the State of São Paulo, been granted the Preliminary, Installation and Operation Environmental Licenses by CETESB (São Paulo State Environmental Agency), which performs

⁶ For more information access the site: <http://www.ecourbis.com.br/>

frequent inspections at CTL to monitor the operation with a view to the technical requirements and conditioning factors of the Environmental License issued, with the last inspection report dated May/2024.

Every week, São Paulo public services regulation agency inspects CTL to monitor the operational conditions of the landfill.

For this crediting period, estimates of GHG emission reductions are:

- Annual average GHG emission reduction: 1,042,542 tCO₂e
- Total estimated GHG emission reductions: 3,127,627 tCO₂e

Contribution of the Project Activity to Sustainable Development:

With the implementation of the project activity, besides the GHG emissions reduction (CH₄) there is also contribution for the sustainable development through the improvement of the local environmental condition. During the operational phase, which take place 24 hours/day, 7 days/week, there are new jobs created locally for duties related to construction, operations and maintenance, landscaping, plumbing, monitoring and security personnel. These people are fully trained by EcoUrbis on their duties and tasks. Local jobs are also created during the implementation and operation of the project activity.

EcoUrbis has been carrying out an environmental educational program called "Programa Ver de Perto" (in English, Close Look Program) which has been put into practice since CTL Landfill planning phase and will be extended for all the operational period. Since 2008, the program actions have already reached more than 57,385 students, teachers and local communities around the landfill, highlighting issues related to the municipal solid waste (MSW), from waste generation to final disposal.

Since its implantation, the program carries out several activities such as:

- a. Formative activities along with teachers and the general community,
- b. “*Programa Ver de Perto*” (in English, Close Look Program) meeting the landfill. Teachers and students take part in monitored visits as well as participate in educational speeches and discussions broaching around environmental issues focused on solid waste and involving the waste generation in the city of São Paulo and the waste management from the first operation to the final closing of the landfill. In addition, it includes an informative topic concerning the environmental impacts of Greenhouse Gases (GHGs). This program informs the community of the importance of CTL Landfill Gas Project and why such projects which collect LFG are being viewed as having two benefits. The first is reducing methane emissions from landfills and the second is using the LFG as a renewable energy source. Also, this program provides an in-site of a Landfill Gas-to-Energy project in their community and the benefits of this project.

EcoUrbis also carry out an important integration activity between the employees, social entities and institutions located in São Paulo State. The company has planned to have, among others:

- a. Work Prevention and Security:
Identification of situations that must be revised and re-evaluated offering permanent trainings and improvements;
- b. General Occupational health:
Employee work environment and occupational health follow up. The company offers health care plans for all its employees and their spouses and children;
- c. Technological and “Know How” evolution:
Keep the employees dully qualified and aligned with the current job market conditions and requirements. The project activity needs engineers and other specialists with experience in this area to advise EcoUrbis while implementing the project. These professionals also train local operators and engineers on operations and maintenance of the facilities. Technology needs to come from

abroad and mainly from the United States and Canada. Hence, technology transfer occurs from countries with strict environmental legislative requirements and environmentally sound technologies.

A.1.1. Eligibility of the project under Gold Standard

>>

The project meets the eligibility criteria as per section 3.1.1 of GS4GG Principles & Requirements, as follows:

Eligibility Criteria	Justification
(a) Types of Projects Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section. Section 2.1.2 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) Projects shall lead to generate and deliver energy services from non-fossil fuel and renewable energy sources, supplying energy to a national or a regional grid. Section 3.1.1 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) Pre-identified CSA project types are a) Renewable energy; b) End-use energy efficiency; c) Waste management and handling; Section 5.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.2) The Following Project types are eligible for issuance of GSVERs or GSCERs: a) Renewable Energy	The project activity results in greenhouse gas (GHG) emission reduction from the CTL landfill through the ways below: • Burning CH₄ in flares; • Supply consumers through a dedicated pipeline. Therefore, this project will lead to climate change mitigation, which meets the Section 2.1.2 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) and the project activity falls under section 1.3.1 “Methane recovery project activities shall be eligible for emission reductions from both methane avoidance (including from the flared LFG fraction) and non-renewable fuel substitution as long as evidence is provided on time for validation to demonstrate that the system was designed in a way to at least make use of some of the LFG recovered for the delivery of energy services (e.g., heat)” of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4). Besides, the project activity falls under section 5.1.1 (c) “Waste Handling & Disposal: The waste handling and disposal category refers to all waste handling Projects that deliver an energy service or

Supply; b) End-Use Energy Efficiency Improvement; c) Waste Handling & Disposal; d) Land Use and Forests; e) carbon dioxide removal (working definition).	a usable product with sustainable development benefits (e.g., composting).” of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.1). As per section 4.1.3 of <i>GS4GG Principles & Requirements</i> (Version 1.2), “A Project type is automatically eligible for Gold Standard Certification if there are Gold Standard approved Activity Requirements and/or Impact Quantification Methodologies associated with it or it’s referenced in the Gold Standard Product Requirements”. The project type is automatically eligible for Gold Standard Certification.
(b) Location of Project: Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) Projects may be located in any part of the world. Section 3.2 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) Eligible projects may be located in any part of the world Section 3.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.2) VER Projects may be located in any host country or state have mandatory operational schemes to reduce GHG emissions in any form (e.g., cap & trade, carbon tax etc.), Projects shall only be eligible if the Project Developer has either: (a) provided Gold Standard with satisfactory justification that no double counting of emission reductions occurs or (b) committed to retiring eligible units equal to the quantity of Gold Standard VERs, which must be	The project location is Brazil (refer to section A.2 of the PDD for detailed project area and boundary). The project owner has signed the Declaration of No Double Counting Statement and Declaration of not involved in other GHG scheme to ensure that the project will not apply for emission reduction credits or labels under any other schemes other than GS. In addition, if any such risk of double counting exists, project developer confirms that the eligible units equal to the quantity of Gold Standard VERs will be retired/ returned/abandoned. Therefore, the emission reductions will not be double counted. As per section 3.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.2), it is an eligible host country.

done prior to VER issuance. Refer to Section 15 below of this document.	
(c) Project Area, Project Boundary and Scale: Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact Quantification Methodologies and Products Requirements. Section 3.3.1 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) Project Area and Boundary shall be defined in line with the applicable Impact Quantification Methodologies and Product Requirements. Section 3.3.2, The definition of scale is the same for all Projects, except Microscale. Section 3.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.1) Gold Standard VER Projects may be located in any host country or state have mandatory operational schemes to reduce GHG emissions in any form (e.g., cap & trade, carbon tax etc.), Projects shall only be eligible if the Project Developer has either: (a) provided Gold Standard with satisfactory justification that no double counting of emission reductions occur or (b) committed to retiring eligible units equal to the quantity of Gold Standard VERs, which must be done prior to VER issuance. Refer to Section 15 below of this document.	The project location is in Brazil (refer to section A.2 of the PDD for detailed project area and boundary). The project boundary is defined based on <i>ACM0001</i>. The spatial extent of the landfill and the LFG capture structure, the flaring system and the energy source. Refer to section B.3 of the PDD for more details. Annual emission reductions of the project activity is more than 60,000 tCO₂e. As per section 9.1.1 and 9.1.2 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.1), it's a large-scale GS VER project. The project area doesn't overlap with that of another Gold Standard or other voluntary or compliance standard programme of a similar nature. In addition, if any such risk of double counting exists, project developer confirms that the eligible units equal to the quantity of Gold Standard VERs will be retired.

Section 9.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements (Version 2.1)</i> GS VER Projects may be registered as “large scale”, “small scale” (for the applicability of methodologies and tools only) or “microscale”. Scale is defined in the relevant Activity Requirements or where these do not exist then per following paragraphs. Section 9.1.2 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements (Version 2.1)</i> All Projects exceeding the small-scale thresholds are defined as large scale. Small scale projects are defined following CDM project standard for project activities.	
(d) Host Country Requirements Section 3.1.1 of <i>GS4GG Principles & Requirements (Version 1.2)</i> Projects shall be in compliance with applicable Host Country’s legal, environmental, ecological and social regulations. Section 3.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements (Version 2.1)</i> VER Projects may be located in any host country or state. However, where host countries or states have mandatory operational schemes to reduce GHG emissions in any form (e.g., cap & trade, carbon tax etc.), Projects shall only be eligible if the Project Developer has either: (a) provided Gold Standard with satisfactory justification that no double counting of emission reductions occur or	The project location is in Brazil (refer to section A.2 of the PDD for detailed project area and boundary). CTL Landfill began its operation on 24 November 2010 and was designed with a passive LFG collection and open flaring system (at the top of the vertical draining wells). In order to meet with the landfill operation geotechnical, environmental and safety conditions according to the EIA/RIMA approved by CETESB (Environmental Agency of Sao Paulo State). With the approval of the EIA/RIMA, CTL landfill received from CETESB the Operational License no. 30006398, process number 30/00847/08, issued on 23/11/2010 and valid until 23/11/2015. Regarding the environmental license from the landfill area expansion, a new Operational License has been issued by CETESB, no 30010065, process number 30/00847/08, issued on 26/02/2016 and valid until 26/02/2021. Currently, the landfill count on an updated operational license 30012899 issued on 09/04/2021 and valid until 09/04/2026. Thus,

(b) committed to retiring eligible units equal to the quantity of Gold Standard VERs, which must be done prior to VER issuance.	besides being defined as new landfill in the PDD, CTL Landfill already had an existing passive LFG capture system at the start of its operation but not an existing active LFG capture system and flaring as the project activity.
(e) Contact Details Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) As part of the Project Documentation the Project Developer shall provide (i) name and (ii) contact details of all Project Participants; AND in case of an organization (iii) the legal registration details and (iv) documentation by the governing jurisdiction that proves that the entity is in good standing (defined as being a legal or other appropriate entity registered in or allowed to operate within the required jurisdiction and with no evidence of insolvency or legal/criminal notices placed against it or any of its Directors). Gold Standard retains the right (at its own discretion) to refuse use of the Standard where reputational concerns are highlighted.	The Project Participants' contact details are provided in Appendix 2. Contact information of project participants of this PDD. EcoUrbis Ambiental S/A won the concession to perform the collection, transport, treatment, and final disposal of Municipal Solid Waste (MSW) and of Health Services in the Southeast Grouping of the Municipality of São Paulo, contract number 026/SSO/04 was signed on October 6th, 2004. EcoUrbis Ambiental S.A.⁷ is the company responsible for the implementation and operation of the CTL landfill and, also, it is responsible, since October/2004, for collection services and disposal of solid waste in region East and South of the city of São Paulo (covering around 6,000,000 of inhabitants) under a concession for twenty years, renewable for another twenty years. On June 13th, 2024, the concession was renewal, and it is valid up to October 12th, 2044. EcoUrbis Ambiental S.A. also counts on a code of ethics an implemented compliance system and policies such as (instituted in 2016): • Anti-Corruption Policy; • Policy on Gifts and Entertainment;

⁷ For more information access the site: <http://www.ecourbis.com.br/>

	• Supplier Hiring Policy; • Donation and Sponsorship Policy; • Partnership Policy.
(f) Legal Ownership Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) Full and uncontested legal ownership of any Products that are generated under Gold Standard Certification, (for example carbon credits) shall be demonstrated. Where such ownership is transferred from project beneficiaries this must be demonstrated transparently and with full, prior and informed consent (FPIC). Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately report to Gold Standard any land title/tenure disputes arising.	Landfill and Project Activity are investments made by the project owner, who has full and uncontested legal ownership of the credits that will be generated under Gold Standard Certification. In addition, confirmation of the GS VERs ownership was discussed during the local stakeholder consultation. The project owner has the legal ownership of the emission reductions generated by the project activity. Refer to section A.1.2 of the PDD for further details.
(g) Other Rights Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (for example, access rights, water rights etc.). Any known disputes or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	EcoUrbis Ambiental S.A. is the company responsible for the implementation and operation of the CTL landfill and, also, it is responsible, since October/2004, for collection services and disposal of solid waste in region East and South of the city of São Paulo (covering around 6,000,000 of inhabitants) under a concession for twenty years, renewable for another twenty years. On June 13th, 2024, the concession was renewal, and it is valid up to October 12th, 2044.

(h) Official Development Assistance (ODA) Declaration Section 3.1.1 of <i>GS4GG Principles & Requirements</i> (Version 1.2) All Project Developers applying for project activities located in a country named by the OECD Development Assistance Committee's ODA recipient list and seeking Gold Standard Certification for carbon credits shall declare the Official Development Assistance (ODA) support. The Project Developer shall follow the GHG Emissions Reduction & Sequestration Product Requirements and submit the declaration at the time of Design Certification. Section 6.1.1 and 6.1.2 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.1) Projects are ineligible for carbon crediting under GS4GG if the OFFICIAL DEVELOPMENT ASSISTANCE (ODA) is provided to the project under the condition that the credits generated by the Project will be transferred, either directly or indirectly, to the donor country providing ODA support. The OECD defines ODA as financial flows: a. To developing countries and multilateral institutions; b. Provided by government agencies (e.g., USAID); c. Whose main objective is the economic development and welfare of developing countries; and d. That are concessional in character, conveying a grant element of at least 25%.	The project owner has signed the ODA declaration template and confirms that no ODA is provided under the condition that the credits generated by the project will be transferred, either directly or indirectly, to the donor country providing ODA support.
--	---

Project Developer submitting a Project located in a country named by the OECD Development Assistance Committee's ODA recipient list shall sign and submit the ODA Declaration.	
(i) Suppressed Demand Section 3.4.1 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4) Certain Impact Quantification methodologies allow projects to account Suppressed Demand scenario when establishing a baseline. In such cases, the application of Suppressed Demand baseline is limited to Small Scale and Microscale Projects.	Suppressed demand baseline is not applicable to the project. As per Section 3.4.1 of <i>GS4GG RENEWABLE ENERGY ACTIVITY REQUIREMENTS</i> (Version 1.4), it can be a large-scale GS VER project.
(j) Eligible Greenhouse Gases Section 4.1.1 of <i>GS4GG GHG Emissions Reduction & Sequestration Product Requirements</i> (Version 2.1) Only Carbon Dioxide (CO₂), Methane (CH₄) and/or Nitrous Oxide (N₂O) are eligible for GSVERs or GSCERs, provided Projects comply with all GS4GG Requirements and eligibility criteria.	The project considers the emission reductions of Carbon Dioxide (CO ₂), methane (CH ₄) and/or Nitrous Oxide (N ₂ O), which are eligible for Gold Standard crediting. Refer to section B.3 of the PDD for further details.

The project participants clarifies that: (i) the project is only registered within the CDM under the UNFCCC and participants are aware of all GS rules established aiming at preventing double counting⁸; (ii) Brazil has not implemented any cap and trade system to date; (iii) the project area does not overlaps with any other emission reduction project activity; and, (iv) the project has all the necessary permits to operate, including, but not limited to, environmental permit and DNA authorization.

⁸ Ecourbis signed a declaration on 16/10/2024 committing itself to employ all available resources to prevent double counting along with Consumers 1, 2 and 3. This declaration was sent to VVB.

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

>>

EcoUrbis Ambiental S.A. is the company responsible for the implementation and operation of the CTL landfill and, also, it is responsible, since October/2004, for collection services and disposal of solid waste in region East and South of the city of São Paulo (covering around 6,000,000 of inhabitants) under a concession for twenty years, renewable for another twenty years. On June 13th, 2024, the concession was renewal, and it is valid up to October 12th, 2044.

A.2 Location of project

>>

Host Party:

Brazil

Region/State/Province etc:

São Paulo State

City/Town/Community etc:

São Paulo City

Physical/Geographical location:

CTL landfill is located at Av. Sapopemba, 22,254 – km 32, São Paulo (city), São Paulo (State), Brazil.

Geographical Coordinates: (Latitude: 23° 37' 52.17" S and Longitude: 46° 25' 30.29" W)⁹



Figure 1 - Geographical position of São Paulo city, inside of São Paulo State

(Source: <https://cidades.ibge.gov.br/brasil/sp/sao-paulo/panorama>)

⁹ The information is in the environmental impact report (EIA) of the CTL landfill and the document was given to DOE in validation visit.



Figure 2 - Aerial view of CTL Landfill

A.3 Technologies and/or measures

>>

The implementation and operation of the CTL Landfill Gas Project consists concisely in:

LFG Capture and Collection Systems

The landfill gas capture and collection infrastructure of the landfill was designed with horizontal trenches and with the recovery of the vertical wells/drains. The horizontal trenches and vertical wells/drains are connected to the collection system known as well as transmission pipeline that accomplishes the transport of gas to the flaring station responsible for its treatment and/or destruction.

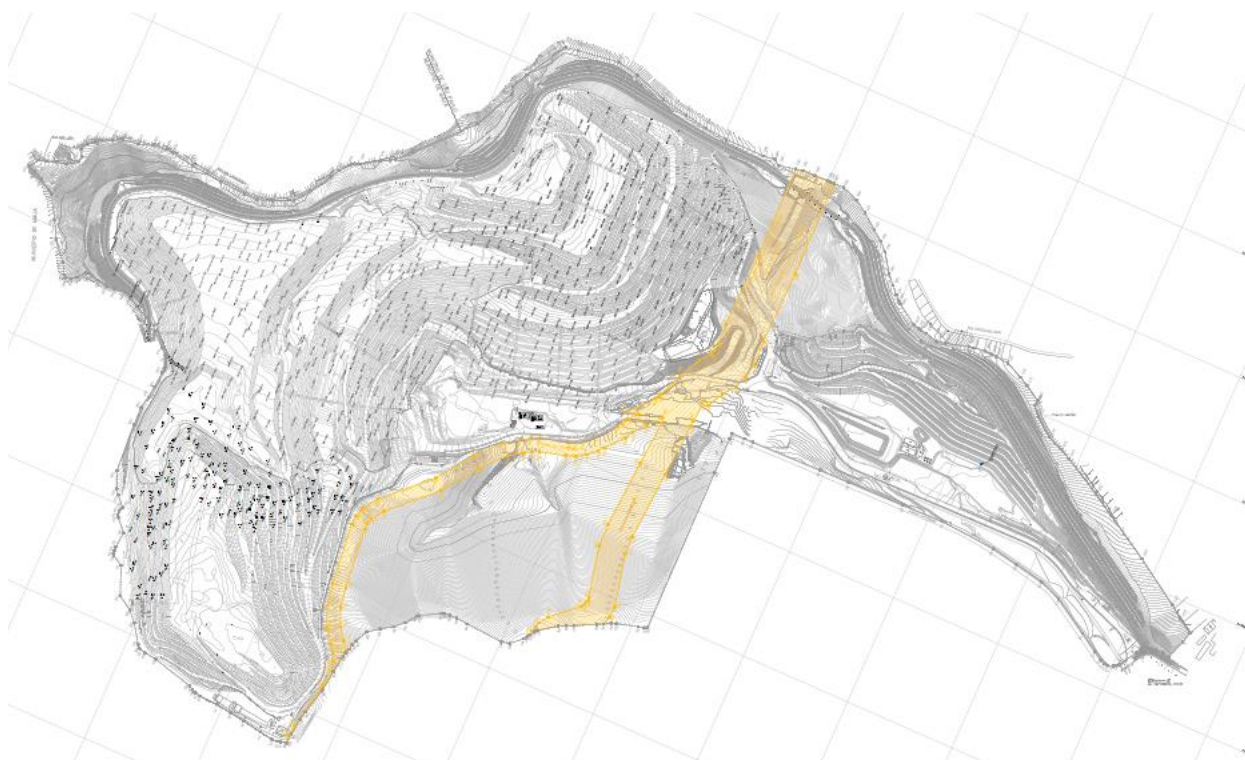


Figure 3 - General view of the LFG Capture and Collection Systems and Flaring Station.

- Capture System (Horizontal Trenches)

The capture system consists of a grid of horizontal trenches made of High-Density Polyethylene (HDPE), due to the flexibility and the corrosion resistance. Each trench has an average length of 100 meters and is installed with approximately 15 meters away from each other. The capture system will continue to be installed throughout the lifetime of the CTL. Currently CTL landfill counts with approximately 590 drains, where 187 are connected to the LFG collection network and 146 under active collection, which means counting with adequate LFG quality and flow.

The figures below show an example of the installation of a horizontal trench.



Figure 4 - LFG Drainage System

(Source: EcoUrbis Ambiental S.A.)

All horizontal trenches (capture system) are connected to a collection system known as well as transmission pipeline that transports the landfill gas to the flaring station.

Each individual trench can regulate the concentrations of O_2 in the LFG collected. In case the concentrations are above a certain value, it means that maybe some air is infiltrating in the landfill and the valve corresponding to the trench is then closed. The periodic operation of the horizontal trenches will promote a systematic control and monitoring of the characteristics of the LFG extracted.

- Vertical Wells/Drains

In order to drain the leachate of the landfill, vertical wells/drains are progressively installed. In order to recover the LFG which is released through the wells/drains, the project aim to cap the vertical wells/drains and connect them to the collection system. The average distance is about 30 – 35 meters from each other. The top of the drains is equipped with LFG wellheads. This equipment connects the drain to the pipeline.

Also, CTL landfill counts with a proper leachate drainage system and periodic monitoring of the generated leachate quality. The leachate is sent for external treatment, and quality is monitored in order to meet the local established standards.



Figure 5 – Leachate drainage system

(Source: EcoUrbis Ambiental S.A.)

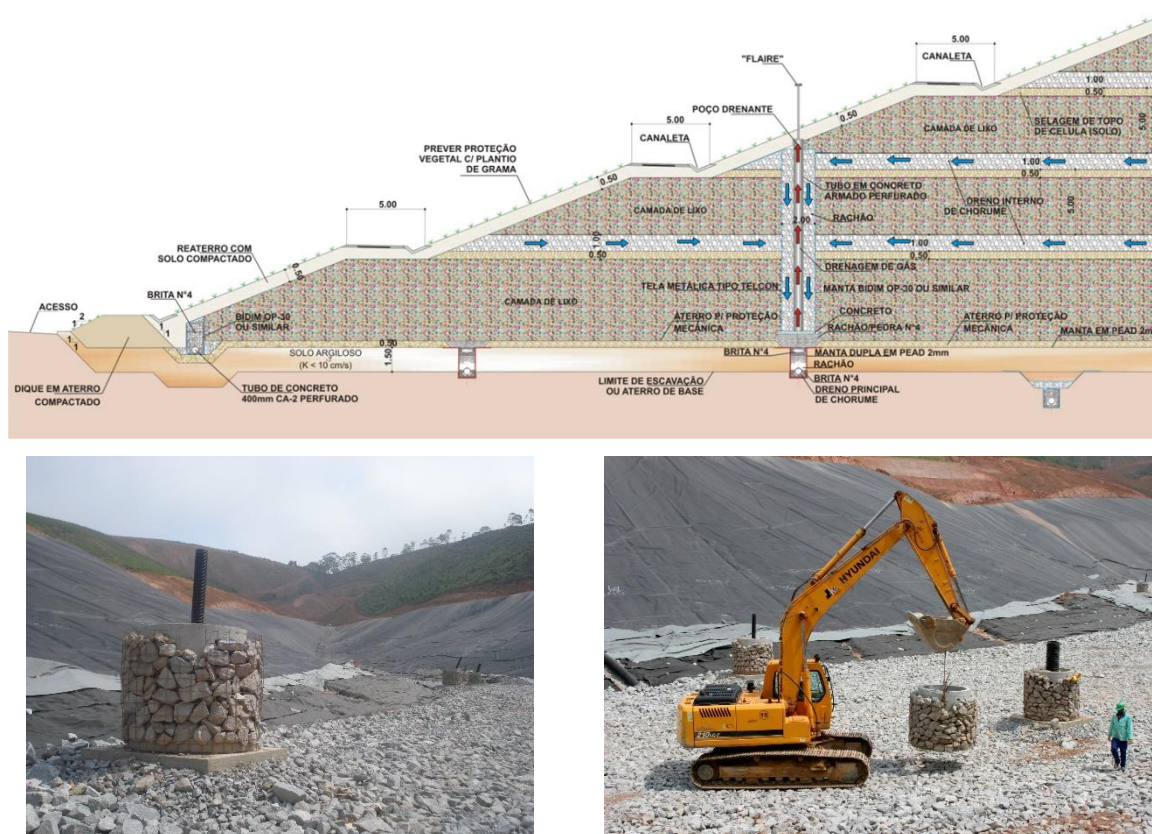


Figure 6 – Design of vertical wells/drains.

(Source: EcoUrbis Ambiental S.A.)

- Collection System (Transmission Pipeline)

The collection system, known as well as transmission pipeline, transports the collected LFG to the flaring station.

The collection system is usually built using High-Density Polyethylene (HDPE), due to the flexibility and the corrosion resistance. The sizing of the piping is designed considering the maximum production of landfill gas. Intense welding activity is expected to connect each horizontal trench to the transmission pipeline.



Figure 7 – Connected transmission pipelines

(Source: EcoUrbis Ambiental S.A.)

Flaring Station

The collection of LFG within the landfill is made by applying a pressure differential in each horizontal trench and or vertical well/drain. The depressurization system is composed of a group of centrifugal multi-stage blowers, connected in parallel with the main transmission pipeline. The depressurization of the system depends on the pressure of operation of flares. In addition, the Flaring Station usually has:

- Flares;
- Blowers;
- Safety valve on/off;
- Remover of condensate;
- Gas Analyzer;
- Meter for pressure;
- Meter for flow;
- Meter for temperature.
- The Flare System

The destruction of the methane content in the LFG collected is made via enclosed flares, in order to assure higher methane destruction (above 98%)¹⁰.

The flare efficiency is monitored according to Option B.1: Biannual measurement of the flare efficiency.

The flaring station counts on a system of destruction of methane through flares. This system is composed by 3 enclosure flares and may have additional units installed, according to the LFG generation.

Basically, the flare is constructed using refractory material, a gas inlet, dampers to control the air inlet, an ignition spark, flame viewer and points to sample collection, as presented in the pictures below.

The flare is constructed in a vertical cylindrical combustion chamber, where the landfill gas is flared at a constant temperature (around 1,000° C), controlled by the admission of air, and with a retention time > 0.7 seconds.

¹⁰ The destruction of the methane content in the LFG is above 98%, according to manufacturer specifications. The document was given to DOE in validation visit. Since flare efficiency is monitored according to Option B.1: Biannual measurement and flare design is considered as low height flare, flare efficiency discount in ERs calculations is 15%



Figure 8 – Flaring station at CTL Landfill Gas Project
(Source: EcoUrbis Ambiental S.A.)



Figure 9 - Enclosed Flare system at CTL Landfill Gas Project
(Source: EcoUrbis Ambiental S.A.)

- The Blower System

The blower system is responsible to give negative pressure to the landfill, suctioning the gas to the pipeline. The dimensioning of the blower depends on the final use of the LFG (flare, boiler, dedicated pipeline).

In order to preserve the operation of the blowers, a dewatering system is installed to remove any condensate present in the LFG. This equipment is a single knock-out dewatering component.



Figure 10 – Blower system at CTL Landfill Gas Project

(Source: EcoUrbis Ambiental S.A.)

Supply LFG to consumers through a dedicated pipeline

The supplying of LFG to the consumers is made using a dedicated pipeline connecting CTL LFG plant to consumers. Currently, CTL supplies LFG for the following consumers:

- LFG supply to consumer 1 (SJEA): Since April 28th, 2014

- LFG supply to consumer 2 (FSL/ZEG¹¹): Since March 1st, 2019
- LFG supply to consumer 3 (METAGAS): Since April 12th, 2024

The lifetime of the project is 25 years¹².

The project is marked as registered in CDM (currently 2nd CP), by the Title: 5947 CTL Landfill Gas Project¹³.

Monitoring system:

The process is controlled by an electrical control system equipped with a Programmable Logical Controller (PLC). All details related to monitoring of CDM project are provided in section B.7. of this PDD.

A.4 Scale of the project

>>

Large-scale, using ACM0001 v19.0.

A.5 Funding sources of project

>>

There is no Annex I public funding involved in the project activity.

¹¹Currently owned by GASWATT due to contract transferring

¹² In accordance with manufacturer's specifications and technical literature. Evidences made available to DOE. Thus, the project activity is expected to operate until 29/02/2037, comprehending the whole crediting period.

¹³ https://cdm.unfccc.int/Projects/DB/LRQA_Ltd1332768548.38/view?cp=2

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

>>

The following methodologies are applicable to this project activity:

- Large-scale Consolidated Methodology ACM0001: "Flaring or use of landfill gas" (Version 19.0)¹⁴;
- TOOL02 Methodological tool: "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0)¹⁵;
- TOOL04 Methodological tool: "Emissions from solid waste disposal sites" (Version 08.0)¹⁶;
- TOOL05 Methodological tool: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)¹⁷;
- TOOL06 Methodological tool: "Project emissions from flaring" (Version 03.0)¹⁸;
- TOOL08 Methodological tool: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0)¹⁹;
- TOOL09 Methodological tool: "Determining the baseline efficiency of thermal or electric energy generation systems" (Version 02.0)²⁰;
- TOOL10 Methodological Tool: "Tool to determine the remaining lifetime of equipment" (Version 01)²¹;
- TOOL11 Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)²²;

¹⁴ <https://cdm.unfccc.int/methodologies/DB/JPYB4DYQUXQPZLBDVPHA87479EMY9M>

¹⁵ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-02-v7.0.pdf>

¹⁶ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-04-v8.0.pdf>

¹⁷ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-05-v3.0.pdf>

¹⁸ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-06-v3.0.pdf>

¹⁹ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-08-v3.0.pdf>

²⁰ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-09-v2.0.pdf>

²¹ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-10-v1.pdf>

²² <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-11-v3.0.1.pdf>

- TOOL12 Methodological tool: "Project and leakage emissions from transportation of freight" (Version 01.1.0)²³;
- TOOL07 Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0)²⁴;
- TOOL32 Methodological tool: "Positive lists of technologies" (Version 04.0)²⁵

B.2. Applicability of methodology (ies)

>>

ACM0001 (version 19.0) "Flaring or use of landfill gas"	
Applicability Criteria	Justification
This methodology applies to project activities that include the destruction of methane emissions and displacement of a more-GHG-intensive service by capturing landfill gas from the landfill site and/or flaring and/or using to produce energy (i.e. electricity, thermal energy); and/or using to supply consumers through natural gas distribution network, dedicated pipeline or trucks.	This methodology is applied to the project activity since the CH ₄ is destructed in flare and used to supply consumers through dedicated pipeline.
This methodology is applicable under the following conditions: (a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or (b) Make an investment into an existing LFG capture system to increase the recovery rate or	a) This methodology is applicable because it was installed a new LFG capture system in an existing SWDS where no LFG capture system was installed prior to the implementation of the project activity (there was only in the SWDS a <u>passive</u> system where the LFG was released to atmosphere through drained wells). b) An investment was made into an existing LFG capture <u>passive system</u> to increase the recovery

²³ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-12-v1.1.0.pdf>

²⁴ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v7.0.pdf>

²⁵ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-32-v4.0.pdf>

change the use of the captured LFG, provided that: (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available; (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: (i) Generating electricity; (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace;¹ and/or (iii) Supplying the LFG to consumers through a natural gas distribution network; (iv) Supplying compressed/liquefied LFG to consumers using trucks;² (v) Supplying the LFG to consumers through a dedicated pipeline; (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	rate where the LFG was vented and not used prior to the implementation of the project activity. Thus, there was not an existing <u>active</u> LFG capture system. c) In the project activity, the LFG is flared in the enclosed flares and supplied to consumers through a dedicated pipeline. d) The amount of organic waste is the same in the project activity as well as in the absence of the project activity, since there is no organic waste recycling plant in the area that is served by the landfill. As per the box 1 requirements: a) Despite landfill influence area has made progress in organic waste recycling through composting and selective collection, the initiatives remains negligible. The CTL landfill still receives significant organic waste, but ongoing initiatives aim to reduce this through decentralized composting and policy enforcement in the future. b) Landfill influence area has a mix of large-scale municipal composting plants, decentralized community hubs, and private/cooperative initiatives recycling organic waste. However, coverage is still negligible compared to the volume of organic waste generated and sent to landfills. c) The project activity will not impact the amount of organic waste which is recycled since the waste received by the landfill is agreed between the landfill and the Municipality through a public
---	--

	concession. It means that the organic waste sent to the landfill cannot be delivered to any other waste disposal site. d) It is assumed that plants identified in (b) operates in its maximum capacity. However, coverage is still negligible compared to the volume of organic waste generated and sent to landfills.
This methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: (a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln: (i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or (ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary; (c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas. (d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric	a) This methodology is applicable because in this project activity, the LFG would be released to atmosphere or destructed in drained wells by passive venting to address safety and odour concerns. c) In the project activity, the LFG is used to supply to end-user through a dedicated pipeline where in the absence of the project activity, the end-user would be supplied by natural gas. (d) The SWDS is not a Greenfield site, thus, this case is not applicable.

release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.	
This methodology is not applicable: (a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace; (b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.	a) The project activity does not claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace or for implementation energy efficiency measures at a kiln or glass melting furnace. b) The project activity will not change, deliberately, the management of the SWDS to change during the crediting period in order to increase methane generation compared to the situation prior to the implementation of the project activity (e.g. addition of liquids, pre-treating waste and so on).

TOOL02 (version 07.0) "Combined tool to identify the baseline scenario and demonstrate additionality"	
Applicability Criteria	Justification
This tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established.	This tool is applicable, and in the Section B.4 of this document, it is presented all alternative scenarios identified as realistic and credible to the project activity.

TOOL03 (version 03.0) "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion"	
Applicability Criteria	Justification

This tool provides procedures to calculate project and/or leakage CO₂ emissions from the combustion of fossil fuels. It can be used in cases where CO₂ emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process <i>j</i> this tool is being applied.	This tool is applicable due to the consumption of fossil fuel by the project activity. In the particular case of the project activity, Liquefied Petroleum Gas (LPG) has been used to ignite the installed flares (after events of planned or unplanned interruptions of operation of the flares). The applicability condition of the methodological tool is thus met.
--	---

TOOL04 (version 08.1) "Emissions from solid waste disposal sites"	
Applicability Criteria	Justification
This tool can be used to determine emissions for the following types of applications: (a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex-ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS); (b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or	This methodology is applicable to the project activity because the project activity mitigates methane emissions from a specific existing SWDS. In the project activity, methane emissions are mitigated by capturing and flaring or combusting the methane (ACM0001: Flaring or use of landfill gas). The methane is generated from <u>MSW</u> that was disposed in the past in the SWDS, including prior to the start of the project activity. Thus, the alternative <u>Application A</u>) is used to calculate ex-ante estimation of emissions.

avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions. In the case that: (a) different types of residual waste are disposed or prevented from disposal; or that (b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW.	
---	--

TOOL05 (version 03.0) "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"	
Applicability Criteria	Justification
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or	This tool is applicable according to <u>Scenarios A and B</u>, since the project activity includes electricity consumption from the grid when LFG power plant is operational and electricity consumption from the diesel generator (fossil fuel fired captive power plant <u>is not connected</u> to the electricity grid) when electricity from the grid is not available.

(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid. This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	
This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO₂ emissions.	There are no installed captive renewable power generation technologies to provide electricity in the project activity, in the baseline scenario or to sources of leakage.

TOOL06 (version 04.0) "Project emissions from flaring"	
Applicability Criteria	Justification
This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.	In the project activity there are enclosed flares installed.

This tool is applicable to the flaring of flammable greenhouse gases where: (a) Methane is the component with the highest concentration in the flammable residual gas; and (b) The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	The landfill gas generated during the project activity includes CH₄, H₂S, O₂, CO, CO₂, N₂ and H₂, of which CH₄ is the main component (±50%). This tool is applied since the project activity involves the flaring of landfill gas where methane is the component with the highest concentration and the source of the residual gas is a gas from a biogenic source (landfill gas). Therefore, this tool is adopted used for determining the mass flow of a greenhouse gas.
The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. In the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare and these shall be followed by the project participant.	This tool is not applicable to the use of auxiliary fuels in the project activity and all operating specifications provided by the manufacturer of the enclosed flare are followed.

TOOL08 (version 03.0) "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"	
Applicability Criteria	Justification
Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions. Methodologies where CO₂ is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as material balances are the cost-effective way of monitoring flow of CO₂. The underlying methodology should specify: (a) The gaseous stream the tool should be applied to;	The project activity is capturing and flaring and combusting the methane. Thus, this tool is applicable to the project activity because the applicable methodology (ACM0001) demands measuring flow, volumetric fraction and gas composition of residual and exhaust gases for the determination of baseline and project emissions. a) Methodological tool" Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is applied in the PDD. b) The mass flow is determined in the monitoring plan of the PDD.

(b) For which greenhouse gases the mass flow should be determined. (c) In which time intervals the flow of the gaseous stream should be measured; and (d) Situations where the simplification offered for calculating the molecular mass of the gaseous stream (equations (3) or (17)) is not valid (such as the gaseous stream is predominantly composed of a gas other than N₂).	c) The flow of the gaseous stream is measured continuously. d) The gaseous stream is dry, equation (5) and (6) of this tool are used to calculate the mass flow of greenhouse gas. The option chosen from this "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is option A). However, during the project operational monitoring, if not demonstrated that the temperature of the gaseous stream (T_t) is less than 60°C (dry basis), then the flow measurement should be assumed to be on a wet basis and the option B is applied instead.
--	---

TOOL09 (version 03.0) "Determining the baseline efficiency of thermal or electric energy generation systems"	
Applicability Criteria	Justification
The tool describes various procedures to determine the baseline efficiency of an energy generation system, for the purpose of estimating baseline emissions. The tool may be used in case of project activities that improve the energy efficiency of an existing system through retrofits or replacement of the existing system by a new system. The tool provides different procedures to determine the baseline efficiency of the energy generation system: either a) a load-efficiency function is determined which establishes the efficiency as a function of the operating load of the system or b) the efficiency is determined conservatively as a constant value. This tool is applicable to energy generation systems that:	This tool is not applicable to this project activity since there is no energy generation system.

(a) Generate only electricity (and no thermal energy); or (b) Produce only thermal energy (and no electricity); or (c) Produce both electricity and thermal energy (cogeneration). Also, the following conditions apply: (a) The tool is applicable to waste heat recovery systems to calculate efficiency values using options (A) to (E) as provided under paragraph 12 below; (b) The tool can be applied only if load is the main operating parameter¹ that influences the efficiency of the energy generation system. For cogeneration systems, the heat to power ratio may also be considered a main operating parameter. Methodologies referring to this tool should specify for which energy generation systems the tool is used and whether a load-efficiency function and/or a constant efficiency should be determined.	
--	--

TOOL10 (version 01) "Tool to determine the remaining lifetime of equipment"	
Applicability Criteria	Justification
This tool provides guidance to determine the remaining lifetime of baseline or project equipment. The tool may, for example, be used for project activities which involve the replacement of existing equipment with new equipment or which retrofit existing equipment as part of energy efficiency improvement activities.	According to the applied methodology, section 5.2, item 17, the procedure for determining the remaining lifetime of existing equipment is only applied if equipment used at the project activity was installed prior to its implementation. In the case of this project activity, the baseline scenario is that LFG would be released to atmosphere or destructed in drained wells by passive venting to address safety and odour concerns. The current

Methodologies referring to this tool should clearly specify for which equipment the remaining lifetime should be determined. The remaining lifetime of relevant equipment shall be determined prior to the implementation of the project activity. Project participants using this tool shall document transparently in the CDM-PDD how the remaining lifetime of applicable equipment has been determined, including (references to) all documentation used. Under this tool, impacts on the lifetime of the equipment due to policies and regulations (e.g. environmental regulations) or changes in the services needed (e.g. increased energy demand) are not considered. Methodologies referring to this tool shall, where applicable, provide specific guidance on how regulations that warrant the replacement of the equipment before it has reached the end of its technical lifetime should be addressed. This procedure applies if LFG is used in equipment that was in operation prior to the implementation of the project activity.	equipment has not installed prior the implementation of project activity. Therefore, this tool is <u>not applicable in accordance with applied methodology</u>.
--	--

TOOL11 (version 03.0.1) "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"	
Applicability Criteria	Justification
This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to	This tool is applicable to the project activity since it is required to assess the continued validity of the baseline and update the baseline and the data and parameters at the renewal of a crediting period.

evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period. Step 1: Assess the validity of the current baseline for the next crediting period Step 2: Update the current baseline and the data and parameters	
--	--

TOOL12 (version 01.1.0) “Project and leakage emissions from transportation of freight”	
Applicability Criteria	Justification
This tool provides procedures to estimate project or leakage CO₂ emissions from freight transportation. Two options are given to determine these emissions: (a) Option A: monitoring fuel consumption; or (b) Option B: using conservative default values. This tool is applicable to project activities which involve freight transportation by road and where transportation is not the main project activity²⁶. This tool is not applicable to project activities where transportation is the main source of greenhouse gases emissions. This tool does not provide procedures to estimate baseline emissions from road transportation of freight. The tool only provides to determine CO₂ emissions.	This tool is not applicable to this project activity since there is no transportation of freight.

²⁶ This applicability condition ensures that transport-related emissions are small relative to the expected total emission reductions and, for this reason, enables to use a simplified approach to estimate project or leakage emissions from transportation of freight.

CH₄ and N₂O emissions are excluded for simplification as they are small compared to CO₂ emissions. In addition, the tool is applicable for the determination of project or leakage emissions from freight transportation by rail in project activities where transportation is not the main project activity.	
--	--

TOOL32 (version 04.0) "Positive lists of technologies"	
Applicability Criteria	Justification
This methodological tool contains lists of technologies and associated conditions that confer automatic additionality to CDM project activities and CDM PoAs that apply such technologies and meet specified conditions (hereinafter referred to as positive lists). The use of this methodological tool is not mandatory for the project participants of a CDM project activity or CDM PoA for demonstrating their additionality. This methodological tool shall be applied in conjunction with a small-scale or large-scale methodology which refers to this tool. The positive lists as contained in section 5 of this tool are valid up to 10 March 2025. <u>Section 5</u> When applying baseline and monitoring methodologies that refer to this tool, project activities and PoAs are deemed automatically additional if they exclusively apply the	This tool is applicable to the project activity since the LFG is used to (b) generate heat for external consumption (through a dedicated pipeline) and (c) flared in enclosed flare. Thus, the additionality of the project activity is automatic.

technologies listed under this section and demonstrate that they fulfill the related conditions specified in the same section. <u>Section 5.1. Waste handling and disposal</u> 5.1.1. Landfill gas recovery and its gainful use The project activities and PoAs at new or existing landfills (greenfield or brownfield) are deemed automatically additional, if it is demonstrated that prior to the implementation of the project activities and PoAs the landfill gas (LFG) was only vented and/or flared (in the case of brownfield projects) or would have been only vented and/or flared (in the case of greenfield projects) but not utilized for energy generation, and that under the project activities and PoAs any of the following conditions are met: (a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW; (b) The LFG is used to generate heat for internal or external consumption; (c) The LFG is flared.	
---	--

B.3. Project boundary

>>

Source	GHGs	Included?	Justification/Explanation	
Baseline scenario	Emissions from decomposition of waste at the landfill site.	CO ₂	No	CO ₂ emissions from decomposition of organic waste are not accounted since the CO ₂ is also released under the project activity
		CH ₄	Yes	The major source of emissions in the baseline
		N ₂ O	No	N ₂ O emissions are small compared to CH ₄ emissions from SWDS. This is conservative
	Emissions from electricity consumption	CO ₂	Yes	Electricity may be consumed from the grid or generated onsite/offsite in the baseline scenario
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
	Emissions from the use of natural gas	CO ₂	No	Excluded for simplification. This is conservative
		CH ₄	Yes	Emission source when supplying LFG through a dedicated pipeline
		N ₂ O	No	Excluded for simplification. This is conservative
Project scenario	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO ₂	Yes	May be an important emission source.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from electricity consumption due to the project activity	CO ₂	No	Emissions are considered negligible
		CH ₄	Yes	May be an important emission source
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from flaring	CO ₂	No	Emissions are considered negligible
		CH ₄	Yes	May be an important emission source
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
Emissions from distribution of LFG to costumers through a dedicated pipeline.	CO ₂	No	Emissions are considered negligible	
	CH ₄	Yes	May be an important emission source	
	N ₂ O	No	Emissions are considered negligible	

Note: On-site fossil fuel consumption due to the project activity other than for electricity generation will be due to LPG consumption.

The project boundary of the project activity shall include the site where the LFG is captured and, as applicable:

- (a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network, dedicated pipeline or biogas processing facility); (applicable)
- (b) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity; (applicable)
- (c) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity in the baseline that is displaced by electricity generated by captured LFG in the project activity; (not applicable)
- (d) Heat generation equipment or sources which are supplying heat in the baseline that is displaced by heat generated by captured LFG in the project activity; and (not applicable)
- (e) The transportation of the compressed/liquefied LFG from the biogas processing facility to consumers. (not applicable but delivered to customers through a dedicated pipeline applicable)

The flow diagram is presented below:

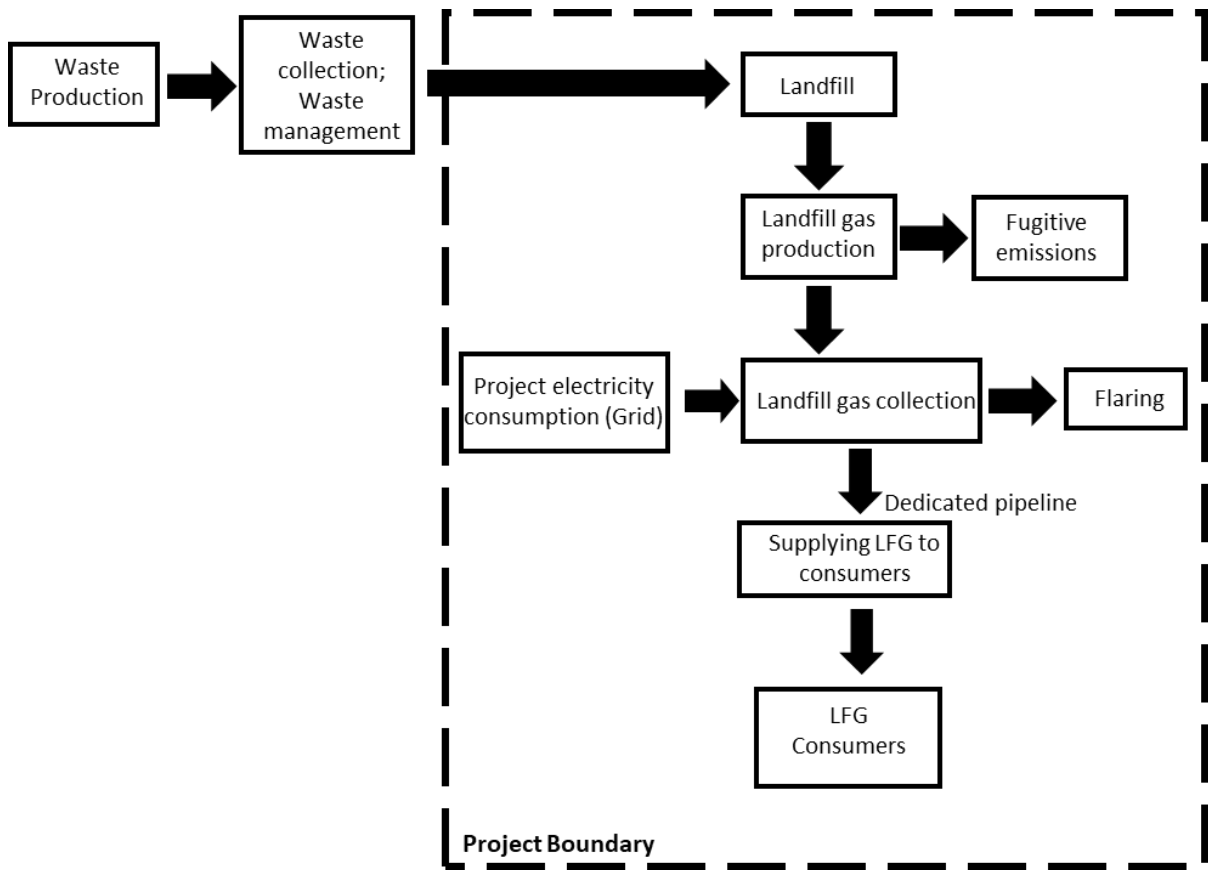


Figure 11 – Flow diagram project boundary²⁷

Project boundary/Area does not overlap with that of another GS or other voluntary or compliance standard programme of a similar nature.

²⁷ End User are the consumers (individuals and industries) benefited with the consumption of the renewable electricity that can be generated by the Project Activity. Delineation defining project activity boundaries.

B.4. Establishment and description of baseline scenario

>>

The baseline scenario for the project activity is identified using step 1 of the “Combined tool to identify the baseline scenario and demonstrate additionality”, as agreed in ACM0001 “Flaring or use of landfill gas”.

According to the CDM Project Standard for Project Activities:

To demonstrate the validity of the original baseline or its update, project participants are not required to re-assess the baseline scenario. Instead, project participants shall assess the GHG emission reductions that would have resulted from that scenario.

The project participants shall assess and incorporate the impact of national and/or sectoral policies and circumstances, existing at the time of requesting the renewal of the crediting period, on the current baseline GHG emissions, without reassessing the baseline scenario”.

According to the methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”, the following steps were taken:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectorial policies

In Brazil, there are no policies regarding mandatory LFG capture or destruction requirements neither local environmental regulations nor policies which promote the productive use of LFG.

In the beginning of 2010, the Política Nacional de Resíduos Sólidos (National Solid Waste Policy), under discussion since 2000, was approved. One of the scopes of this policy is to enforce the adequate environmental final destination of the solid waste. However, the Policy does not foresee either the obligation of landfill gas

destruction or the promotion of the landfill gas use such as those for the production of renewable energy and processing of organic waste²⁸.

The LFG selling via a dedicated pipeline must comply with the same Brazil's National Policy on Solid Waste (PNRS, Law 12,305/2010), which mandates controlled/sanitary landfill standards and encourages LFG capture and utilization to reduce emissions, and the Brazilian Climate Change Policy (Law 12,187/2009 & Decree 11,075/2022), which aligns with methane reduction targets under Brazil's NDCs.

Until the present moment there are no methane reduction targets applied for Brazil's NDC and the Project Participant signed a no double accounting declaration of No Double Counting Statement and Declaration of not involved in other GHG scheme to ensure that the project will not apply for emission reduction credits or labels under any other schemes other than GS.

Compliance requires adherence to landfill operational rules (PNRS), monitoring and reporting of GHG reductions (Climate Policy), and meeting CONAMA air emission standards (Resolution 382/2006) if LFG is combusted. State-level environmental approvals also apply.

ANP Resolution 8/2015, which recognizes LFG as an alternative fuel and sets basic guidelines for its commercialization, though it primarily focuses on processed biogas. For pipeline operations, ANP Resolution 104/2021 applies, regulating the transport of non-conventional gases (including raw LFG) and establishing technical and safety requirements for dedicated pipelines.

The following table presents an analysis of the compliance of the alternatives listed previously with the local/national regulation.

Alternative	Compliance with Local / National Policies	Observations
-------------	---	--------------

²⁸ LEI 12305/2010 – National Solid Waste Policy . Available at: < https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm. >

LFG1: Project Activity undertaken without being registered as a CDM Project Activity	Yes	-
LFG2: Continuation of the landfill operation and LFG atmospheric release (Business as Usual – BAU scenario) or partial LFG capture and destruction through flaring to comply with regulations or contractual requirements, or to address safety and odour concerns, or for other reasons.	Yes	As stated before, there is no current law or contractual requirements to capture/destroy/use the LFG nor enforcing the supply of natural gas

Therefore, the current baseline complies with national and sectoral policies which have come into effect after the submission of the project for registration and are applicable at the time of requesting renewal of the crediting period. The current baseline complies all requirements from:

- National Oil, Gas and Biofuels Agency (“ANP” from the Portuguese Agência Nacional do Petróleo, Gás Natural e Biocombustíveis);
- São Paulo State Environmental Agency (“CETESB” from the Portuguese Companhia Ambiental do Estado de São Paulo);
- The CDM Executive Board.

Since circumstances related to the calculation of the emission factor of the grid have changed, information related to baseline emission factor calculation was reviewed in this third crediting period (see sections B.6.1 and B.6.3).

Step 1.2: Assess the impact of circumstances

No changes have been identified in market characteristics applied for the waste sector and LFG delivery through dedicated pipeline and the conditions used to determine the baseline emissions in the previous crediting period are still valid as

applicable rules entered in force from 2010 to 2022 as stated in Step 1.1, thus before the date of renewal of crediting period.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) is technically possible

Not applicable since Project Activity was a greenfield project and investments were made to make possible its implementation and operation.

Step 1.4: Assessment of the validity of the data and parameters

Considering the applied methodology at the project activity registration (1st crediting period) ACM0001 version 18 has changed to consolidated methodology ACM0001 version 19 and all related applicable tools some ex-ante parameters published by IPCC have been updated accordingly.

There was no update of the methodology version considering the lasted version of registered PDD for the 2nd crediting period.

According to the methodological tool "Tool to assess the validity of the original/current baseline and to update the baseline at the renewal of a crediting period", where any data and parameter used and not monitored during the crediting period are not valid anymore they should be updated following the Step 2 as follows:

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions for the third crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0001.

This update was applied in the context of the sectorial policies and circumstances that are applicable at the time of requesting for renewal of the crediting period, which has not changed as to affect the project. More details for the updated baseline emissions for the third crediting period can be seen in section B.6.

Step 2.2: Update the data and parameters

All parameters regarding the baseline emissions calculation have been updated for the 3rd crediting period. Further information can be seen in section B.6.

Please see below update list:

- Composition of Waste: source available from Internal study
- Waste Disposal: source available from Internal Declaration from landfill operator
- Average technical transmission and distribution losses: extracted from National Energy Balance 2025 - Base year 2024
- Emission Factor: Available from Brazilian DNA²⁹

B.5. Demonstration of additionality

The following table shows the timeline of the project activity showing that the carbon credits benefits were taken into account to implement it.

Table 2 - Implementation timeline of the Project

Key Events	Date
Prior Consideration of the CDM to UNFCCC and Brazilian DNA	06/12/2010
Contract between Designed Operational Entity (DOE) and the PP for the validation process.	20/12/2010
Submit the PDD for Global Stakeholder Consultation (GSC)	08/03/2011

²⁹ <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao>

The starting date of the project activity was the purchase of the main equipment.	29/02/2012
Start-up – LFG capture and flare the landfill gas (LFG) in enclosed flares	July/2012
Start-up – Supply LFG to consumers through a dedicated pipeline	April/2014

According to “Guidelines on the demonstration and assessment of prior consideration of the CDM” – EB 49/Annex 22 paragraph #2:

“The Board decided that for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity, using the standardized form F-CDM-Prior Consideration. Such notification is not necessary if a PDD has been published for global stakeholder consultation or a new methodology proposed to the Executive Board for the specific project before the project activity start date.”

As the PDD was published for global stakeholder consultation before the project activity start date, the notifications for Brazilian DNA and the UNFCCC secretariats are not necessary.

Concerning the notifications which are not necessary, the project participants notified the Brazilian DNA and UNFCCC of their intention to seek CDM status.

The additionality of the project activity will be demonstrated and assessed using the “Combined tool to identify the baseline scenario and demonstrate additionality”.

The Step 0, 1a and 1b are described above in section B.4.

Step 2: Barrier analysis

This step serves to identify barriers and to assess which alternative scenarios are prevented by these barriers as per the latest approved version of the "Guidelines for objective demonstration and assessment of barriers". The following Sub-steps are applied:

Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios

- **Investment barrier:** The implementation of the Scenario 1 (collection and destruction of LFG in enclosed flare + electricity generation in existing and/or new grid-connected power plants) requires a very high amount of investment from such project components:
 - Collection system;
 - LFG transport pipe system;
 - Blowering System;
 - Flare System;
 - LFG Station (edifications).

In Brazil, flaring LFG in enclosed flare does not generate any revenues and has only expenditures. Therefore, the high investment regarding project components described above is not feasible in the economical point of view.

Outcome of Step 2a: Despite Scenario 1 not feasible in the economic point of view, the investment barrier does not prevent the occurrence of it.

Step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

There are no alternative scenarios prevented by barriers above.

Outcome of Step 2b: The three realistic and credible alternative scenarios to the project activity are:

- Scenario 1: LFG1 + E3;
- Scenario 2: LFG1 + E3 + (c);
- Scenario 4: LFG2 + E3

Step3. Investment analysis

Sub-step3a. Determine appropriate analysis method

According to the Section B.2. Applicability of methodologies, TOOL32 (Positive List) is applicable in this project resulting in automatic additionality for this project. However, to reinforce the vulnerability of the project, the financial analysis has also been demonstrated. As the proposed project activity will generate financial benefits other than CDM related income, the Option III is chosen. This option is appropriated because the baseline does not require investment, as per "Guidelines on the assessment of investment analysis".

Sub-step3b. – Option III. Apply benchmark analysis

For the purpose of assessing the financial/economic attractiveness, the indicator used was the Net Present Value (NPV).

The benchmark used for this analysis was the value pointed out in Appendix A (Group 1 - Brazil) of the "Guidelines on the assessment of investment analysis". The value was 11.75%.

Sub-step 3c. Calculation and comparison of financial indicators

The following assumptions were taken for the purpose of the calculation of the financial indicator:

Table 3 - Main assumptions - CTL Landfill Gas Project

CTL Landfill Gas Project				
Assumptions				
	Parameter	Value	Unit	Reference
Assumptions	Benchmark	11.75%	%	Guidelines on the assessment of investment analysis - version 04, Group 1 (Brazil).
	Asset's Life time	25	Years	"Tool to determine the remaining lifetime of equipment" - version 1 (Electric Generators, air cooled) and CRA's document (Engineering company) - file: (10290-001 RevD.pdf)
	Exchange Rate	3.83	R\$/USD	"Banco Central do Brasil" (in English, Brazilian Central Bank) on 15/10/2015 (http://www4.bcb.gov.br/pec/conversao/conversao.asp)
	Tax - IRPJ (income tax)	25%	%	Incomex tax (http://www.receita.fazenda.gov.br/legislacao/ins/Ant2001/Ant1997/1995/insrf05195.htm), accessed on 14/01/2011.
	Tax - CSLL (social contribution)	9%	%	Social contribution (http://www.planalto.gov.br/ccivil_03/LEIS/L7689.htm), accessed on 14/01/2011.
	Tax (PIS)	1.65%	%	Contribution to the Social Integration Program and Civil Service Asset Formation Program – PIS/PASEP (http://www.receita.fazenda.gov.br/principal/Ingles/SistemaTributarioBR/Taxes.htm), accessed on 14/01/2011.
	Tax (Cofins)	7.60%	%	COFINS - Contribution to Social Security Financing (http://www.receita.fazenda.gov.br/principal/Ingles/SistemaTributarioBR/Taxes.htm), accessed on 14/01/2011.
	Depreciation	10	years	Secretary of the Federal Revenue of Brazil. Available on http://www.mmcontabilidade.com.br/flash/taxasdepreciacao.htm , accessed on 04/07/2016. Item: 8501 and Art. 69 of the Lawl No 3.470, from November 28th, 1958.
	Commercial Lending rate	10.97%	%	http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/energias_alternativas.html , accessed on 19/07/2011.
	Debt term	16	years	http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/energias_alternativas.html , accessed on 30/06/2011
	LFG Sales to Consumer 1 (SJEA)	R\$ 4,630,408.99	R\$/year	In 2024. Source: "2024-03 Capex and Revenues 24-36.xlsx"
	LFG Sales to Consumer 2 (FSL/ZEG)	R\$ 1,480,368.37	R\$/year	In 2024. Source: "2024-03 Capex and Revenues 24-36.xlsx"
	LFG Sales to Consumer 3 (METAGAS)	R\$ 4,461,546.16	R\$/year	In 2024. Source: "2024-03 Capex and Revenues 24-36.xlsx"

Note: All numbers are in Brazilian Real (R\$).

Alternative Scenario 1

For the **alternative scenario 1** (LFG capture and collection systems and flaring station) does not generate any revenues and has only expenditures. The estimated cash flow is presented below:

Table 4 – Cash flow for Alternative scenario 1

Scenario 1 - CTL Landfill Gas Project - Cash Flow																											
	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
		Yearly Investment Analysis																									
Biosgas Refining and Electricity generation		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	
INCOME & COSTS ANALYSIS																											
Energy savings (MMBtu/year)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Savings electricity Price (R\$/MMBtu)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Energy savings (R\$)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue for LFG sales (R\$) - Consumer 1 (NR&A)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue for LFG sales (R\$) - Consumer 2 (P&L ZIG)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue for LFG sales (R\$) - Consumer 3 (MET&GAS)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gross Revenue (R\$)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tax (PIS/COFINS)		9.25%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tax (IRMS)		12.00%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Site Public Municipality Costs		5.00%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net revenue			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
O&M Costs - LFG Station			-605	-8,067	-3,048	-8,619	-8,619	-8,619	-9,163	-11,217	-10,443	-10,000	-12,668	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	
O&M Costs - LFG Collection System			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
O&M Costs - Electricity generation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
O&M Total Costs			-605	-8,067	-3,048	-8,619	-8,619	-8,619	-9,163	-11,217	-10,443	-10,000	-12,668	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	
Operational Results - EBITDA			-605	-8,067	-3,048	-8,619	-8,619	-8,619	-9,163	-11,217	-10,443	-10,000	-12,668	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	
Depreciation			0	0	-8,010	-3,111	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	
EBIT			-605	-7,077	-6,165	-7,866	-7,866	-7,866	-12,609	-14,464	-13,690	-13,247	-15,916	-14,699	-14,596	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	
EBIT			-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	
Interests			-400	-271	-500	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	
Interests			-112	-207	-257	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	-265	
Total - interests			-400	-271	-500	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	-228	
EBIT			-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	-2,513	
EBIT			-3,123	-9,250	-9,709	-8,824	-8,778	-7,013	-17,623	-14,664	-17,680	-17,127	-19,970	-14,609	-14,596	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	-14,462	
IRPP / CSL - taxes (Real Profit Regime)		34%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Depreciation			0	0	8,010	3,111	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	
Net operational profit			0	3,123	6,246	6,606	9,577	9,530	4,666	9,976	11,217	10,443	10,000	12,668	14,462	14,462	14,462	14,462	14,462	14,462	14,462	14,462	14,462	14,462	14,462	14,462	
CapEx																											
CapEx - LFG Station			-17,665	-390	-410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CapEx - LFG Collection System			-17,665	-661	-739	0	0	0	-1,493	-3,016	-3,016	-3,016	-3,016	-2,602	-3,016	-3,008	-3,112	-3,017	-3,112	-3,008	-3,112	-3,008	-3,112	-3,008	-3,112	-3,008	
CapEx - Electricity generation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
CapEx - Connection and sales to pipeline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total CapEx			-35,330	-1,051	-1,149	0	0	0	-1,493	-3,016	-3,016	-3,016	-3,016	-2,602	-3,016	-3,008	-3,112	-3,017	-3,112	-3,008	-3,112	-3,008	-3,112	-3,008	-3,112	-3,008	
Drawdown of Debt - Bank financing			24,252	831	1,078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			-1,297	-3,893	-5,631	-5,631	-4,524	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	-2,688	
Debt repayment			-84	-341	-319	-319	-319	-155	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	
Debt repayment			-50	-173	-259	-259	-229	-201	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Debt repayment			0	0	0	0	0	0	0																		

Alternative Scenario 2

For the **alternative scenario 2** – The project activity (capture of landfill gas, flaring and supply of LFG to a dedicated pipeline) undertaken without being registered as a CDM project activity, the estimated project cash flow is presented below:

Table 5 – Cash flow for Alternative scenario 2

Scenario 2 - CTL Landfill Gas Project - Cash Flow		Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Biogas Flaring and Electricity generation			BIYARLY INVESTMENT ANALYSIS																										
INCOME & COSTS ANALYSIS			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	
Energy savings (MWh/year)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Savings electricity Price (R\$/MWh)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Energy savings (R\$)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Revenue for LFG sales (R\$) - Consumer 1 (SBA)			0	0	4,262	5,892	6,053	4,806	5,006	5,226	5,292	4,653	4,294	4,517	4,630	4,746	4,865	4,986	5,111	5,239	5,370	5,504	5,642	5,783	5,927	6,075	6,227		
Revenue for LFG sales (R\$) - Consumer 2 (PSLZEG/ASWATT)			0	0	0	0	0	0	0	465	1,129	1,731	2,248	2,929	1,480	1,513	1,551	1,590	1,634	1,670	1,712	1,755	1,804	1,844	1,890	1,937	1,991		
Revenue for LFG sales (R\$) - Consumer 3 (MUTAGAS)			0	0	0	0	0	0	0	0	0	0	0	0	0	4,462	4,561	4,675	4,791	4,925	5,034	5,160	5,289	5,436	5,557	5,696	5,838	6,000	
Gross Revenue (R\$)			0	0	4,262	5,892	6,053	4,806	5,006	5,391	4,061	6,384	6,542	7,447	10,572	10,820	11,090	11,368	11,670	11,943	12,242	12,548	12,881	13,183	13,513	13,851	14,219		
Tax (PIS/COFINS)			9.25%	0	-394	-544	-560	-445	-463	-514	-570	-591	-605	-689	-978	-1,001	-1,026	-1,052	-1,079	-1,105	-1,132	-1,161	-1,192	-1,218	-1,250	-1,281	-1,315		
Tax (ICMS)			12.00%	0	-511	-707	-726	-577	-601	-607	-687	-766	-785	-894	-1,269	-1,298	-1,331	-1,364	-1,400	-1,433	-1,469	-1,506	-1,546	-1,582	-1,622	-1,662	-1,706		
São Paulo Municipality Costs			5.00%	0	-213	-293	-303	-240	-250	-170	-203	-319	-327	-372	-529	-541	-555	-568	-583	-597	-612	-627	-644	-659	-676	-693	-711		
Net revenues			0	0	3,143	4,345	4,444	3,544	3,692	2,501	2,995	4,798	4,825	5,492	7,797	7,980	8,179	8,384	8,607	8,808	9,028	9,254	9,500	9,723	9,966	10,215	10,486		
O&M Costs - LFG Station			0	-405	-4,067	-5,048	-4,619	-4,619	-4,619	-4,619	-9,362	-10,443	-10,000	-12,668	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463		
O&M Costs - LFG Collection System			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
O&M Costs - Electricity generation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
O&M Total Costs			0	-405	-4,067	-5,048	-4,619	-4,619	-4,619	-4,619	-9,362	-10,443	-10,000	-12,668	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463	-14,463		
Operational Results - EBITDA			0	-405	-924	-703	-155	-1,074	-927	-6,861	-5,225	-5,735	-5,175	-7,177	-6,665	-6,482	-6,283	-6,078	-5,855	-5,654	-5,434	-5,208	-4,962	-4,739	-4,496	-4,247	-3,976		
Depreciation			0	0	-3,010	-3,113	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	-3,247	
EBIT			0	-405	-3,924	-3,816	-3,402	-4,322	-4,175	-10,108	-11,470	-8,982	-8,422	-10,424	-6,902	-6,616	-6,283	-6,078	-5,855	-5,654	-5,434	-5,208	-4,962	-4,739	-4,496	-4,247	-3,976		
EBT			0	-2,518	-2,092	-1,454	-815	-319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Interests			0	0	-86	-72	-50	-28	-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total - interests			0	-2,518	-2,178	-1,637	-858	-411	-47	-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
EBT			0	-3,123	-6,113	-5,454	-4,369	-4,733	-4,222	-10,122	-11,470	-8,982	-8,422	-10,424	-6,902	-6,616	-6,283	-6,078	-5,855	-5,654	-5,434	-5,208	-4,962	-4,739	-4,496	-4,247	-3,976		
IRPJ/CSLL taxes (Real Profit Regime)			34%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Depreciation			0	0	3,010	3,113	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247	3,247		
Net operational profit			0	-3,123	-3,103	-2,340	-1,113	-1,486	-974	-6,878	-8,222	-5,735	-5,175	-7,177	-6,665	-6,482	-6,283	-6,078	-5,855	-5,654	-5,434	-5,208	-4,962	-4,739	-4,496	-4,247	-3,976		
CapEx																													
CapEx - LFG Station			0	-17,605	-390	-610	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
CapEx - LFG Collection System			0	-12,498	-642	-728	0	0	0	-1,693	-816	-1,693	-622	-797	-4,666	-2,692	-2,623	-2,608	-312	-457	-537	-360	-340	-284	-306	-266	-209		
CapEx - Electricity Generation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
CapEx - Connection and sales to pipeline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total CapEx			0	-30,103	-4,032	-1,329	0	0	0	-1,693	-816	-1,693	-622	-797	-4,666	-2,692	-2,623	-2,608	-312	-457	-537	-360	-340	-284	-306	-266	-209		
Drawdowns of debt - Bank financing			24,252	831	1,078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Debt repayment			-1,297	-3,883	-5,821	-5,821	-4,524	-2,906	-1,155	-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Debt repayment			0	0	-58	-133	-159	-199	-155	-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Debt repayment			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total - Debt repayment			0	-1,297	-3,928	-6,012	-6,193	-4,982	-3,320	-301	-129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Net Cash Flow Equity			0	-10,271	-7,273	-8,842	-7,306	-6,468	-4,295	-8,868	-9,167	-7,338	-5,797	-7,974	-11,330	-9,174	-8,906	-8,806	-8,168	-6,111	-5,970	-5,568	-5,302	-5,023	-4,803	-4,514	-4,183		

Benchmark	11.75%
NPV (25 years)	-60,685.36
IRR (25 years)	<8NUM>

Repayment rate per year (%)	-5.33%	-16.01%	-24.00%	-24.00%	-18.65%	-11.98%
-----------------------------	--------	---------	---------	---------	---------	---------

For the **alternative Scenario 2**, the NPV is **kR\$ -60,685.36**. Consequently, this scenario is not deemed attractive by the project participants.

Alternative Scenario 4

The **alternative scenario 4** (atmospheric release of the landfill gas and electricity generation in the grid) is the continuation of the current practice, which is in compliance with all applicable regulations and policies, and was deemed the most plausible alternative to the project activity. As explained above, the **alternative scenario 4** does not generate neither revenues nor expenditures. Therefore, the $NPV = 0$.

TEMPLATE

Sub-step 3d. Sensitivity analysis

The sensitivity analysis was performed varying the revenues, the capital expenses (CapEx) and operational and maintenance costs (O&M) for the alternative scenarios 2 and 4. All parameters ranging from -10% to +10%, as the result presented below:

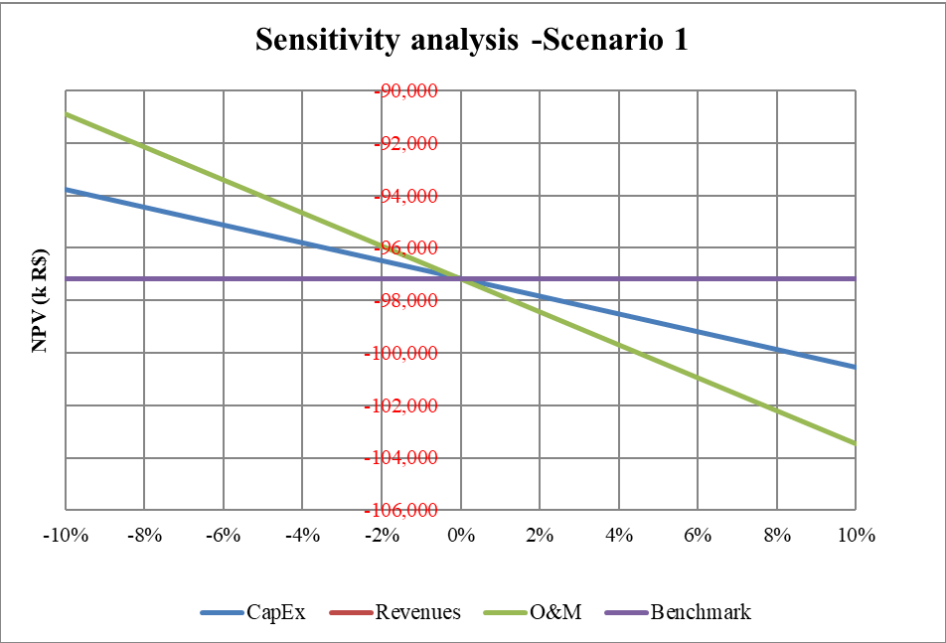
Table 6 - Sensitivity analysis

	Variation	NPV (kR\$)	NPV (kR\$)	NPV (kR\$)
		Scenario 1	Scenario 2	Scenario 4
CapEx	-10%	-93,765	-57,282	0
	10%	-100,571	-64,088	0
Revenues	-10%	-97,168	-65,632	0
	10%	-97,168	-55,739	0
O&M	-10%	-90,879	-54,397	0
	10%	-103,456	-66,974	0
Base Case	0.0%	-97,168	-60,685	0

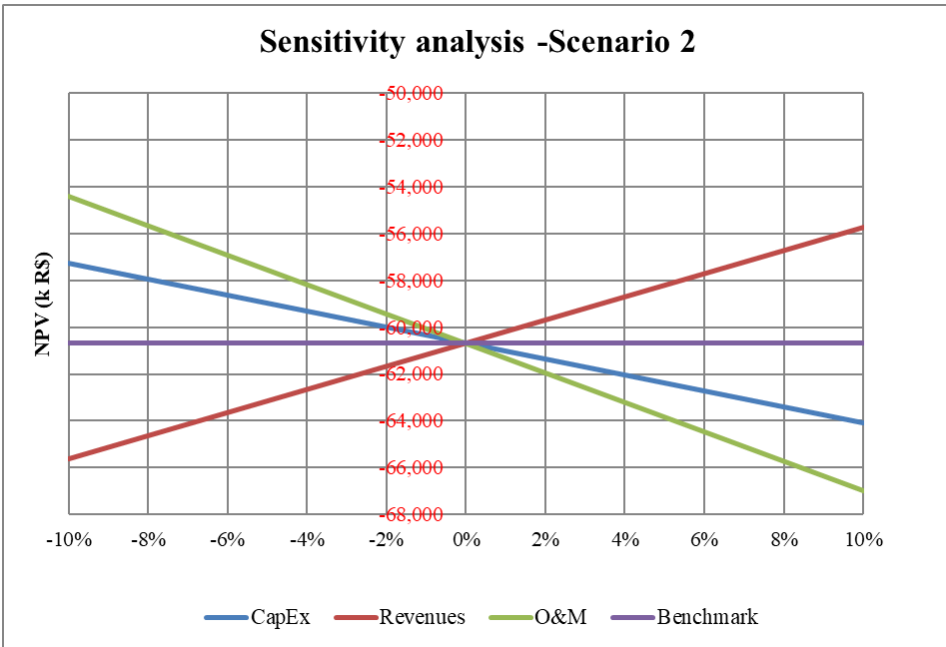
As presented above, the project Net Present Values are always less than or equal to zero in all sensitivity analyses.

The figures below show the sensitivity analysis for the three alternative scenarios (1, 2 and 4).

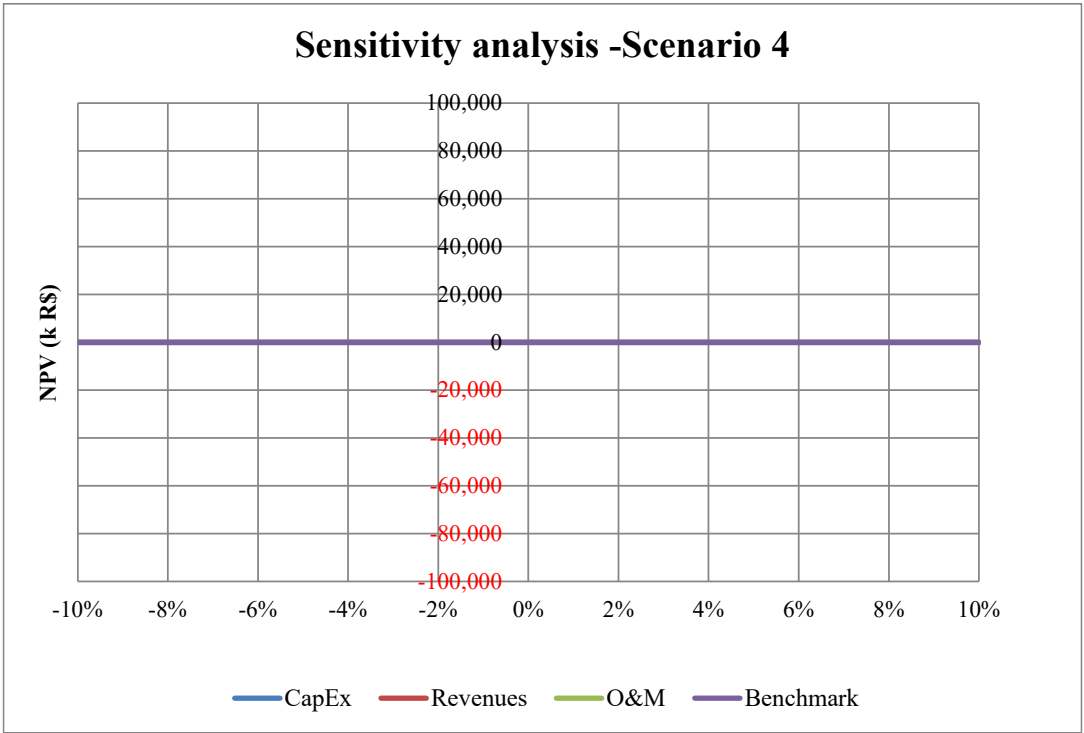
Scenario 1 - Sensitivity analysis



Scenario 2 - Sensitivity analysis



Scenario 4 - Sensitivity analysis



Breakeven point

To ensure the additionality of this project activity, the project proponents varied the three identified parameters (CapEx, Revenues and O&M) until each of them reached the benchmark (i.e. NPV=0). The results are presented below for each alternative (alternative scenarios 1, 2 and 4) and the spreadsheets were provided to the audit team:

Parameter	Breakeven point		
	Alternative Scenario 1	Alternative Scenario 2	Alternative Scenario 4 ³⁰
Capex variation until reach the benchmark (%)	-285.5%	-178.3%	0
Revenue until the benchmark (%)	N/A ³¹	142.9%	0
O&M variation until the benchmark (%)	-168.9%	-109.1%	0

Capital Expenditures (CapEx):

To reach the benchmark, the Capital Expenditures should be reduced in the scenario alternatives 1 and 2, in -285.5% and -178.3%, respectively. Thus, these scenarios are unrealistic.

Revenues:

For **alternative scenario 1**, it is not possible to calculate the breakeven point, since there are not any revenues in this scenario.

For **alternative scenario 2**, the value should be increased in 142.9% to reach the benchmark. Moreover, as the revenues would only come from the LFG selling, the LFG price by volume should increase 168.09%. The exaggerated increase in the LFG price is unlikely to be reached, turning this alternative unrealistic.

³⁰ As in this alternative there are no revenues or expenditures, the NPV is zero. Thus, it is not possible to carry out the breakeven point.

³¹ It is not possible to calculate the breakeven point, since there are not any revenues in Scenario 1.

According to the Brazilian Infrastructure Center, the perspective is that the price of LFG decreases from 14-15 US\$/MMBTU in 2024 to 8-9 US\$/MMBTU in 2032, resulting in a decrease of the LFG price in 42.9% as shown below:

Table 7 - Bioenergy perspectives

	2024	2025	2026	2027	2028	...	2032
Net National Production (MMm ³ /day)	51.76	62.13	70.05	86.27	94.25	...	130.54
National Prices (US\$/MMBTU)	11.07	10.52	10.31	10.20	10.10		3.25
Brent - Projection (US\$/bbl)	85.15	80.94	79.28	78.44	77.66		71.17
Bolivia Contracts (MMm ³ /day)	13.02	13.02	13.02	13.02	13.02		7.82
Reference Price - Bolivia (US\$/MMBTU)	8.80	8.80	8.80	8.80	8.80		8.80
LNG demand (MMm ³ /day)	3.98	5.30	5.30	3.45	3.45		0.00
Reference price - LNG (US\$/MMBTU)	9.33	10.58	11.08	11.33	11.33		11.33
Gas Prices (US\$/MMBTU)	10.92	10.25	10.13	10.06	9.98		9.23
Landfill Gas - LFG (US\$/MMBTU)	14-15	14-15	8-9	8-9	8-9		8-9
Equivalent Price (US\$/MMBTU)	26.04	25.10	23.02	22.22	21.87		21.53

Source: Brazilian Perspectives for the Energy Sector in 2024 (CBIE, 2024)³²

O&M

Also, to reach the benchmark, the O&M shall be reduced in the scenario alternatives 1 and 2, in **-168.9%** and **-109.1%**, respectively. Thus, these scenarios are unrealistic. Thus, the PPs deemed this situation to be unlikely to happen in the future.

Outcome of Step 3

A short list raking the alternative scenarios of the project activity is presented below according to the best NPV (financial indicator), taking into account the results of the sensitivity analyses.

Table 8 – Remaining alternative scenarios

Alternatives	Results
Scenario 4	Best scenario
Scenario 2	Worst scenario
Scenario 1	Very worst scenario

³² <https://tinyurl.com/59t8hrrh>, available on 11/07/2024.

As a result, the sensitivity analysis was conclusive, and the most financially attractive alternative is scenario 4 (NPV=0).

Therefore, it seems reasonable to conclude that the alternative scenarios 1 and 2 are unlikely to be the most financially attractive scenario.

Step 4. Common practice analysis

According to "Guidelines on common practice" (EB 63 - Annex 12), the common practice analysis establishes the following items below:

- **Applicable geographical area:** Brazil is the largest country in South America and the world's fifth largest country in the world. Therefore, the entire host country (Brazil) is considered suitable for this analysis;
- **Measure:** The project activity covers methane destruction in landfills;
- **Output:** the service delivers by the project is LFG to dedicated pipeline (N.m³/h);
- **Technology:** the technology used in the project is supplying consumers with LFG through a dedicated pipeline.

The common practice analysis consists of the following steps:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

For 2024, the foreseen to supply consumers with LFG is 123,327,360 N.m³/h. Then, the output range of the project activity is from 61,663,680 N.m³_{LFG}/h to 184,991,040 N.m³_{LFG}/h.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} . Registered CDM project activities shall not be included in this step 4.

According to Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP)³³, the list with all plants is shown above.

Table 9 – Common practice

Company	City	State
ENGEPI AMBIENTAL LTDA.	JAMBEIRO	SP
GÁS VERDE S.A.	SEROPÉDICA	RJ
GNR DOIS ARCOS VALORIZAÇÃO DE BIOGÁS LTDA.	SÃO PEDRO DA ALDEIA	RJ
GNR FORTALEZA VALORIZAÇÃO DE BIOGÁS LTDA.	CAUCAIA	CE
METAGÁS BIOGÁS E ENERGIA S.A.	SÃO PAULO	SP

Source (ANP, 2024)

The total of the plants is 5. Then, $N_{all} = 5$.

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff} .

The technology of the project activity is supplying consumers with LFG through a dedicated pipeline. All projects in Brazil which supply consumers with LFG through a dedicated pipeline are registered as CDM Projects and therefore, there is no project with the same technologies as the project activity.

Then, $N_{diff} = 5$ or $N_{all} = N_{diff}$.

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

$$F = 1 - \left(\frac{N_{diff}}{N_{all}} \right)$$

³³ <https://www.gov.br/anp/pt-br>, available on 15/07/2024.

$$F = 1 - \left(\frac{5}{5}\right)$$

Therefore, $F = 0$ and $N_{all} - N_{diff} = 0$.

According to Guidelines on common practice: “the proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3”.

Outcome of common practice analysis.

The project activity is not a common practice because the factor $F = 0$ and the $N_{all} - N_{diff} = 0$.

B.5.1 Prior Consideration

>>

The project asked for prior consideration under the original standard as part of registration procedure.

B.5.2 Ongoing Financial Need

>>

The project developer carried out a financial analysis of the project, which concludes that it would not be attractive without the revenue from the sale of carbon credits.

The project's activity is not considered common practice, because in Brazil there is no obligation to burn biogas in landfills, as is the case with the project activity.

A CONFIDENTIAL signed company statement detailing project information highlighting the key categories and amounts of project income and outgoings, including the relative proportion of certification related cost and revenue history and cashflow has been provided to VVB. In summary, the document approaches the following information:

- Project incomes from two different sources:
 - Carbon Credit sales, where its cash flow was directly affected during the time when it was not able to sell carbon credits (between 2021, 2022 and 2023, when the UNFCCC suspended the certifications and Project was still in the process to obtain its registration with Gold Standard).

- Landfill Gas selling through dedicated pipeline, which was allocated to cover the operational and maintenance costs associated with the implementation and continuity of the project.
- The periods when the company was able to sell the carbon credits for a reasonable price, the Project presented great development, since enabled investments in both structure and manpower, resulting in bigger reduction of CO² emissions, and consequently, more generation of carbon credits.
- The Project fits perfectly with the concept of “ongoing financial need” and Gold Standard principles, because in this case, the carbon credits are not just important, but essential for the Project’s continuity.
- Cashflow showing period from 2021 to 2024 shows negative accumulated results for 2021, 2022, 2023 and 2024. Therefore, until the present moment there are no reveals to have positive project results, based on Project Revenues from Carbon Credits against Project Expanses.

Regarding the Design certification renewal rules, paragraph 5.1.47 from Principles and Requirements v 1.2, from the last to the current crediting period:

- No changes in the Project as related to the General Eligibility Criteria;
- All relevant updates from Gold Standard Requirements were incorporated into the Project Activity;
- No re-definition of Baseline Scenario and no impact of change on the Eligibility Principles, Criteria and Requirements;
- No change in specific requirements of Gold Standard activity, product or methodology;
- Ongoing Financial Need (OFN) has been demonstrated.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

		SDG IMPACT
SUSTAINABLE DEVELOPMENT GOALS TARGETED	MOST RELEVANT SDG TARGET	INDICATOR (PROPOSED OR SDG INDICATOR)

13 Climate (mandatory)	Action	13.2: Integrate climate change measures into national policies, strategies and planning	Yearly reductions	emission
4 Quality Education		4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.	Number of people from local community attending company's socioenvironmental activities events. Based on monthly attendance list and/or monthly activities reports	
5 Gender Equality		5.5: Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	Monitored Indicator: Quantity of women in managerial positions. Based on at least one woman in leadership and decision-making positions by showing signed company functional organizational chart in the determined year.	
7 Affordable and Clean Energy		7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	Monthly LFG	selling invoices.
8 Decent Work and Economic Growth		8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Monitored Indicator: Total jobs generated as a result of the project. Based on company functional organizational chart in the determined year.	

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact
>>

For SDG 13:

Baseline emission calculation

The baseline emission was calculated according to the following formula:

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

Where:

- BE_y = Baseline emissions in year y (tCO₂e/yr)
- $BE_{CH_4,y}$ = Baseline emissions of methane from the SWDS in year y (tCO₂e/yr)
- $BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (tCO₂/yr)
- $BE_{HG,y}$ = Baseline emissions associated with heat generation in year y (tCO₂/yr)
- $BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (tCO₂/yr)

As the project burns LFG, there is no electricity generation and send LFG to a dedicated pipeline, the $BE_{EC,y} = 0$ and $BE_{HG,y} = 0$.

Therefore, $BE_y = BE_{CH_4,y} + BE_{NG,y}$

Step (A): Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$)

$$BE_{CH_4} = \left((1 - OX_{top_layer}) \times F_{CH_4,PJ,y} - F_{CH,BL,y} \right) \times GWP_{CH_4}$$

Where:

- $BE_{CH_4,y}$ = Baseline emissions of LFG from the SWDS in year y (tCO₂e/yr)
- OX_{top_layer} = Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
- $F_{CH_4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year y (tCH₄/yr)
- $F_{CH_4,BL,y}$ = Amount of methane in the LFG that would be flared in the baseline in year y (tCH₄/yr)
- GWP_{CH_4} = Global warming potential of CH₄ (tCO₂e/tCH₄)

Step A.1: *Ex-post* determination of $F_{CH_4,PJ,y}$

During the crediting period, the $F_{CH_4,PJ,y}$ will be determined as follows:

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

Where:

$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (tCH ₄ /yr)
$F_{CH_4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year y (tCH ₄ /yr)
$F_{CH_4,EL,y}$	=	Amount of methane in the LFG which is used for electricity generation in year y (tCH ₄ /yr)
$F_{CH_4,HG,y}$	=	Amount of methane in the LFG which is used for heat generation in year y (tCH ₄ /yr)
$F_{CH_4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year y (tCH ₄ /yr)

As the project burns LFG and send LFG to a dedicated pipeline, the $F_{CH_4,EL,y} = 0$ and $F_{CH_4,HG,y} = 0$. Thus, the equation is:

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

$F_{CH_4,NG,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" and monitoring the working hours of the power plant(s), boiler(s), air heater(s), glass melting furnace(s) and kiln(s), so that no emission reduction are claimed for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year y ($Op_{j,h,y}$).

The following requirements apply:

- (a) The gaseous stream the tool shall be applied to the LFG delivery pipeline to each item of electricity generation or heat generation equipment j , or

the natural gas distribution system, or the dedicated pipeline, or the trucks. $F_{CH_4,EL,y}$ and $F_{CH_4,HG,y}$ are then calculated as the sum of mass flows to each item of electricity generation or heat generation equipment j ;

- (b) CH₄ is the greenhouse gas for which the mass flow should be determined;
- (c) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations (3) or (17) in the tool);
- (d) The mass flow should be calculated on an hourly basis for each hour h in year y ;
- (e) The mass flow calculated for hour h is 0 if the equipment is not working in hour h ($Op_{j,h}$ =not working), the hourly values are then summed to a yearly unit basis.

The amount of methane destroyed by flaring ($F_{CH_4,flared,y}$) will be determined as follows:

$$F_{CH_4,flared,y} = F_{CH_4,sent_flare,y} - \frac{PE_{flare,y}}{GWP_{CH_4}}$$

Where:

$F_{CH_4,flared,y}$	=	Amount of methane in the LFG which is destroyed by flaring in year y (tCH ₄ /yr)
$F_{CH_4,sent_flare,y}$	=	Amount of methane in the LFG which is sent to the flare in year y (tCH ₄ /yr)
$PE_{flare,y}$	=	Project emissions from flaring of the residual gas stream in year y (tCO ₂ e/yr)
GWP_{CH_4}	=	Global warming potential of CH ₄ (tCO ₂ e/tCH ₄)

$F_{CH_4,sent_flare,y}$ will be determined directly using the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”, applying the requirements described below. The tool shall be applied to the gaseous stream flowing in the LFG delivery pipeline to each flare.

According to “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” the following options will be considered for the present project activity:

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

And

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

Option A

Flow measurement on a dry basis is not doable for a wet gaseous stream. Therefore, it is necessary to demonstrate that the gaseous stream is dry to use this option. The demonstration will be made as following:

- Demonstrate that the temperature of the gaseous stream (T_t) is less than 60°C (333.15 K) at the flow measurement point.

The mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

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

With

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

Where:

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

$V_{t,db}$ = Volumetric flow of the gaseous stream in time interval t on a dry basis (m³ dry gas/h)

- $v_{i,t,db}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas)
- $\rho_{i,t}$ = Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m^3 gas i)
- P_t = Absolute pressure of the gaseous stream in time interval t (Pa)
- MM_i = Molecular mass of greenhouse gas i (kg/kmol)
- R_u = Universal ideal gases constant (8,314 Pa.m³/kmol.K)
- T_t = Temperature of the gaseous stream in time interval t (K)

If it cannot be demonstrated that the gaseous stream is dry, then the flow measurement should be assumed to be on a wet basis and the option B should be applied instead.

Option B

The mass flow of greenhouse gas i ($F_{i,t}$) is determined using equations used to Option A. The volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$) is determined by converting the measured volumetric flow from wet basis to dry basis as follows:

$$V_{t,db} = V_{t,wb} / (1 + v_{H_2O,t,db})$$

Where:

- $V_{t,db}$ = Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
- $V_{t,wb}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis (m^3 wet gas/h)
- $v_{H_2O,t,db}$ = Volumetric fraction of H₂O in the gaseous stream in time interval t on a dry basis ($m^3 H_2O/m^3 dry_gas$)

The volumetric fraction of H₂O in time interval t on a dry basis ($v_{H_2O,t,db}$) is estimated according to following equation.

$$v_{\text{H}_2\text{O},t,\text{db}} = \frac{m_{\text{H}_2\text{O},t,\text{db}} * \text{MM}_{t,\text{db}}}{\text{MM}_{\text{H}_2\text{O}}}$$

Where:

$v_{\text{H}_2\text{O},t,\text{db}}$	= Volumetric fraction of H_2O in the gaseous stream in time interval t on a dry basis ($\text{m}^3 \text{H}_2\text{O}/\text{m}^3 \text{dry gas}$)
$m_{\text{H}_2\text{O},t,\text{db}}$	= Absolute humidity in the gaseous stream in time interval t on a dry basis ($\text{kg H}_2\text{O}/\text{kg dry gas}$)
$\text{MM}_{t,\text{db}}$	= Molecular mass of the gaseous stream in time interval t on a dry basis ($\text{kg dry gas}/\text{kmol dry gas}$)
$\text{MM}_{\text{H}_2\text{O}}$	= Molecular mass of H_2O ($\text{kg H}_2\text{O}/\text{kmol H}_2\text{O}$)

The absolute humidity of the gaseous stream ($m_{\text{H}_2\text{O},t,\text{db}}$) will be determined using Option 2 (simplified calculation without measurement of the moisture content):

Option 2: Simplified calculation without measurement of the moisture content

This option provides a simple and conservative approach to determine the absolute humidity by assuming the gaseous stream is dry or saturated depending on which is the conservative situation³⁴.

Concerning the project activity, the conservative situation will be to assume that the gaseous stream is saturated, then $m_{\text{H}_2\text{O},t,\text{db}}$ is assumed to equal the saturation absolute humidity ($m_{\text{H}_2\text{O},t,\text{db},\text{sat}}$) and calculated using the following equation.

³⁴ An assumption that the gaseous stream is saturated is conservative for the situation that the mass flow of greenhouse gas i is underestimated (applicable for calculating baseline emissions). Conversely, an assumption that the gas stream is dry is conservative for the situation that the greenhouse gas i is overestimated (applicable for calculating project emissions).

$$m_{\text{H}_2\text{O},t,\text{db},\text{Sat}} = \frac{p_{\text{H}_2\text{O},t,\text{Sat}} * \text{MM}_{\text{H}_2\text{O}}}{(P_t - p_{\text{H}_2\text{O},t,\text{Sat}}) * \text{MM}_{t,\text{db}}}$$

Where:

- $m_{\text{H}_2\text{O},t,\text{db},\text{sat}}$ = Saturation absolute humidity in time interval t on a dry basis (kg $\text{H}_2\text{O}/\text{kg}_{\text{dry_gas}}$)
- $p_{\text{H}_2\text{O},t,\text{Sat}}$ = Saturation pressure of H_2O at temperature T_t in time interval t (Pa)
- T_t = Temperature of the gaseous stream in time interval t (K)
- P_t = Absolute pressure of the gaseous stream in time interval t (Pa)
- $\text{MM}_{\text{H}_2\text{O}}$ = Molecular mass of H_2O (kg $\text{H}_2\text{O}/\text{kmol H}_2\text{O}$)
- $\text{MM}_{t,\text{db}}$ = Molecular mass of the gaseous stream in a time interval t on a dry basis
(kg dry gas/kmol dry gas)

Parameter $\text{MM}_{t,\text{db}}$ is estimated using the following equation.

$$\text{MM}_{t,\text{db}} = \sum_k (v_{k,t,\text{db}} * \text{MM}_k)$$

Where:

- $\text{MM}_{t,\text{db}}$ = Molecular mass of the gaseous stream in time interval t on a dry basis (kg dry gas/kmol dry gas)
- $v_{k,t,\text{db}}$ = Volumetric fraction of gas k in the gaseous stream in time interval t on a dry basis (m^3 gas k/m^3 dry gas)
- MM_k = Molecular mass of gas k (kg/kmol)
- k = All gases, except H_2O , contained in the gaseous stream (e.g. N_2 and CH_4). See available simplification below

The determination of the molecular mass of the gaseous stream ($\text{MM}_{t,\text{db}}$) requires measuring the volumetric fraction of all gases (k) in the gaseous stream. However as a simplification, in the case of the project activity, the volumetric fraction of the methane that is a greenhouse gas and considered in the emission reduction calculation in the underlying methodology must be monitored and the difference to 100% may be considered as pure nitrogen. The simplification is not acceptable if it is differently specified in the underlying methodology.

$PE_{\text{flare},y}$ shall be determined using the methodological tool “Project emissions from flaring”. If LFG is flared through more than one flare, then $PE_{\text{flare},y}$ is the sum of the emissions for each flare determined separately.

Enclosed flare(s) have been installed in the project activity to increase the destruction efficiency. Those flares reach 98% (minimum)³⁵ of methane destruction efficiency.

To determine the project emissions from flaring gases was used the tool “Project emissions from flaring”. The project emissions calculation procedure is given in the following steps:

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” shall be used to determine the following parameter:

Parameter	SI Unit	Description
$F_{\text{CH}_4,m}$	kg	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;

³⁵ The document about the specification of the flare efficiencies has been provided to DOE. Since flare efficiency is monitored according to Option B.1: Biannual measurement and flare design is considered as low height flare, flare efficiency discount in ERs calculations is 15%

- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the 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 fed 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 “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” by the project participant is option A. However, during the project operational monitoring, if not demonstrated that the temperature of the gaseous stream (T_t) is less than 60°C (dry basis), then the flow measurement should be assumed to be on a wet basis and the option B should be applied instead.

Step 2: Determination of flare efficiency

Enclosed flare

In the case of enclosed flares, project participants 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.

The project participant has chosen Option B.

In the present project activity the flare efficiency for minute m ($\eta_{flare,m}$) will be determined by Option B.1 of the methodological tool “Project emissions from flaring”, where the flare efficiency is measured in a biannual basis or, if the biannual measurements are not available, Option A of the methodological tool “Project emissions from flaring” will be used. Both options are described below:

For enclosed flares that are defined as low height flares, which is the case of the project activity, the flare efficiency in the minute m ($\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Option A. For

example, the default value applied should be 80%, rather than 90%, and if for example the measured value was 99%, then the value to be used shall correspond to 89%.

Option A: Default value

The flare efficiency for the minute m ($n_{\text{flare},m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

(1) The temperature of the flare ($T_{\text{EG},m}$) and the flow rate of the residual gas to the flare ($F_{\text{RG},m}$) is within the manufacturer's specification for the flare ($\text{SPEC}_{\text{flare}}$) in minute m ; and,

(2) The flame is detected in minute m (Flame_m).

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

Option B: Measured flare efficiency

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

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

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

In applying Option B, the project participants chose to determine $n_{\text{flare,calc},m}$ using Option B.1 where the measurement is conducted by an accredited entity on a biannual basis.

Option B.1: Biannual measurement of the flare efficiency

The calculated flare efficiency $\eta_{\text{flare,calc},m}$ is determined as the average of two measurements of the flare efficiency made in year y ($\eta_{\text{flare,calc},y}$), as follows:

$$\eta_{\text{flare,calc},y} = 1 - \frac{1}{n} \sum_{t=1}^n \left(\frac{F_{\text{CH}_4,\text{EG},t}}{F_{\text{CH}_4,\text{RG},t}} \right) - 0.05$$

Where:

$\eta_{\text{flare,calc},y}$	=	Flare efficiency in the year y
$F_{\text{CH}_4,\text{EG},t}$	=	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t (kg)
$F_{\text{CH}_4,\text{RG},t}$	=	Mass flow of methane in the residual gas on a dry basis at reference conditions in the time period t (kg)
t	=	The two time periods in year y during which the flare efficiency is measured, each a minimum of one hour and separated by at least six months

$F_{\text{CH}_4,\text{EG},t}$ is measured according to an appropriate national or international standard. $F_{\text{CH}_4,\text{RG},t}$ 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 3: Calculation of project emissions from flaring

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 ($F_{\text{CH}_4,\text{RG},m}$) and the flare efficiency ($\eta_{\text{flare},m}$), as follows:

$$\text{PE}_{\text{flare},y} = \text{GWP}_{\text{CH}_4} \times \sum_{m=1}^{525600} F_{\text{CH}_4,\text{RG},m} \times (1 - \eta_{\text{flare},m}) \times 10^{-3}$$

Where:

$\text{PE}_{\text{flare},y}$	=	Project emissions from flaring of the residual gas in year y (tCO ₂ e)
GWP_{CH_4}	=	Global warming potential of methane valid for the commitment period (tCO ₂ e/tCH ₄)

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

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

Table 10 –Parameters³⁶ used in the Tool “*Project emissions from flaring*”

Parameter	Description	Value	Unit
P_{ref}	Atmospheric pressure at reference conditions	101,325	Pa
R_u	Universal ideal gas constant	0.008314472	Pa.m ³ /kmol.K
T_{ref}	Temperature at reference conditions	273.15	K
GWP_{CH_4}	Global warming potential of methane valid for the commitment period	28 ³⁷	tCO ₂ /tCH ₄
$\rho_{CH_4,n}$	Density of methane at reference conditions	0.716	kg/m ³

Step A.1.1: *Ex-ante* estimation of $F_{CH_4,PJ,y}$

An *ex ante* estimate of $F_{CH_4,PJ,y}$ is required to estimate baseline emission of methane from the SWDS in order to estimate the emission reductions of the proposed project activity in the CDM-PDD. It is determined as follows:

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

Where:

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

$BE_{CH_4,SWDS,y}$ = Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (tCO₂e/yr)

³⁶ As the Option B.1 of the tool “*Project emissions from flaring*” has been adopted to calculate the flare efficiency, the molecular mass parameters are not mentioned.

³⁷ updated as per Applicability of Global Warming Potential for Gold Standard for the Global Goals Projects available at <https://globalgoals.goldstandard.org/standards/RU-2020-PR-V1.2-GWP-values.pdf>

- η_{PJ} = Efficiency of the LFG capture system that will be installed in the project activity
- GWP_{CH_4} = Global warming potential of CH_4 (tCO_2e/tCH_4)

$BE_{CH_4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites". The calculation of $BE_{CH_4,SWDS,y}$ according the tool is:

$$BE_{CH_4,SWDS,y} = \varphi_y \cdot (1 - f_y) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot (1 - e^{-k_j})$$

Where:

- $BE_{CH_4,SWDS,y}$ = Baseline, project or leakage methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (tCO_2e/yr)
- X = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x=1$) to year y ($x=y$).
- Y = Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
- $DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
- $W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
- φ_y = Model correction factor to account for model uncertainties for year y
- f_y = Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
- GWP_{CH_4} = Global Warming Potential of methane
- OX = Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
- F = Fraction of methane in the SWDS gas (volume fraction)
- MCF_y = Methane correction factor for year y
- DOC_j = Fraction of degradable organic carbon in the waste type j (weight fraction)

k_j	=	Decay rate for the waste type j (1/yr)
J	=	Type of residual waste or types of waste in the MSW

According to ACM0001 methodology, the parameter f_y in the methodological tool “Emissions from solid waste disposal sites” shall be assigned a value of 0 (zero) because the amount of LFG that would have been captured and destroyed is already accounted for in equation 2 of this methodology. Also, according to ACM0001 methodology, the parameter X begins with the year that the SWDS started receiving wastes (2010). For this reason, the parameter f_y and X will not be monitored.

Step A.2: Determination of $F_{CH_4,BL,y}$

In the baseline there are no regulatory or contractual requirements, or to address safety and odour concerns to capture and destroy LFG. Thus, the case of the project activity for determining methane captured and destroyed in the baseline is **Case 3** because there is existing LFG capture system (passive system), however there is no requirement to destroy methane. In this case:

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

Where:

$F_{CH_4,BL,sys,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year y for the case of an existing LFG capture system (tCH ₄ /yr)
$F_{CH_4,sent_flare,y}$	=	Amount of methane in the LFG which is sent to the flare in year y (tCH ₄ /yr)

The amount of methane captured with the existing system will be monitored along with the amount captured under the project activity and there is no historic data on the amount of methane that was captured in the year prior to the implementation of the project activity. Thus, the situation to determine $F_{CH_4,BL,y}$ is:

If there is no monitored or historic data on the amount of methane that was captured in the year prior to the implementation of the project situation, then:

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

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

Step (C): Baseline emissions associated with natural gas use ($BE_{NG,y}$)

$$BE_{NG,y} = 0.0504 \times F_{CH_4,NG,y} \times EF_{CO_2,NG,y}$$

Where:

$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year y (tCO ₂ /yr)
$EF_{CO_2,NG,y}$	=	Average CO ₂ emission factor of natural gas in the natural gas network or dedicated pipeline or in the trucks in year y (tCO ₂ e/TJ).
$F_{CH_4,NG,y}$	=	Amount of methane in the LFG which is sent to the natural gas distribution network or dedicated pipeline or to the trucks in year y (tCH ₄ /yr)

$EF_{CO_2,NG,y}$ is determined using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”.

Emission Factor calculation

The project emissions derived from fossil fuels used for electricity consumption from grid connected power plants are estimated and guided using the “Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”. The combined margin emission factor was calculated by the “Tool to calculate the emission factor for an electricity system”, as follows:

Step 1. Identify the relevant electric power system

For the purpose of determining the electricity emission factors, a project electricity system is defined by the spatial extent of the power plants that are physically connected

through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Brazilian DNA published an official delineation of the project electricity system in Brazil, considering a national interconnected system.³⁸

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

Option I: Only grid power plants are included in the calculation.

The Brazilian DNA is responsible for calculating the emission factors and it is not included in calculation the off-grid power plants.

Step 3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

- a) Simple OM, or
- b) Simple adjusted OM, or
- c) Dispatch data analysis OM, or
- d) Average OM.

The Brazilian DNA is responsible for calculating the OM emission factor in Brazil. It uses the method c) Dispatch data analysis OM.

³⁸ DNA Resolution nº 8 was published on 26/05/2008 on https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/cqcl/paginas/copy_of_autoridade-nacional-designada-para-o-mdl#:~:text=Resolu%C3%A7%C3%A3o%20de%20n%C2%BA%208%2C%20de,do%20Mecanismo%20de%20Desenvolvimento%20Limpo), accessed on 15/07/2024.

For the dispatch data analysis OM, it is necessary to use the year in which the project activity displaces grid electricity and to update the emission factor annually during monitoring.

Step 4. Calculate the operating margin emission factor according to the selected method

The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the power units that are actually dispatched at the margin during each hour h where the project is displacing electricity. This approach is not applicable to historical data and, thus, requires annual monitoring of $EF_{grid,OM-DD,y}$.

The emission factor is calculated as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum_h EG_{PJ,h} \cdot EF_{EL,DD,h}}{EG_{PJ,y}}$$

Where:

- $EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin CO₂ emission factor in year y (tCO₂/MWh)
- $EG_{PJ,h}$ = Electricity displaced by the project activity in hour h of year y (MWh)
- $EF_{EL,DD,h}$ = CO₂ emission factor for power units in the top of the dispatch order in hour h in year y (tCO₂/MWh)
- $EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh)
- h = hours in year y in which the project activity is displacing grid electricity
- y = Year in which the project activity is displacing grid electricity

The $EF_{grid,OM,2024}$ is displayed on the Brazilian DNA website, for the year 2024

$$EF_{grid,OM,2024} = 0.4473 \text{ tCO}_2/\text{MWh}$$

Step 5. Calculate the build margin (BM) emission factor

The Brazilian DNA is responsible for calculating the BM emission factor in Brazil.

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor should be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin factor shall be calculated *ex-ante*, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The *Option 2* was chosen for the proposed project.

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{\text{grid,BM},y} = \frac{\sum_m EG_{m,y} \times EF_{\text{EL},m,y}}{\sum_m EG_{m,y}}$$

$$EF_{grid,BM,2018}^{39} = 0.1370 \text{ tCO}_2/\text{MWh}$$

Step 6. Calculate the combined margin emissions factor

The option a) weighted average CM was used to calculate the combined margin (CM).

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

The default weights are as follows: $w_{OM} = 0.25$ and $w_{BM} = 0.75$, fixed for the third crediting period. That gives:

$$EF_{grid,CM,y} = (0.4473 \times 0.25) + (0.1370 \times 0.75) = 0.2146 \text{ tCO}_2/\text{MWh}^{40}$$

The build margin CO₂ emission factors will be ex-ante.

The operating margin CO₂ emission factors will be ex-post.

Therefore, the combined margin CO₂ emission factor will be ex-post.

Project emissions:

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

Where:

PE_y = Project emissions in year y (tCO₂/yr)

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

³⁹ According to STEP 5, option 2 of Tool to calculate the emission factor for an electricity system

⁴⁰The source of the data is from Brazilian DNA. The link is <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao>, accessed on 15/07/2024.

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

$PE_{SP,y}$ Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (tCO₂/yr)

The parameter $PE_{DT,y}$ is not used in the calculation of project emissions since there is no distribution of compressed/liquefied LFG using trucks in the project activity.

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

According to “*Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation*”, the project emission from consumption of electricity will be from two sources:

- $PE_{EC1,y}$ - Grid (Brazilian interconnected electric system);
- $PE_{EC2,y}$ - Diesel generator(s) (off-grid captive power plant)

Thus,

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

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

As electricity will be consumed from the grid, the option A1 of the scenario A was chosen, as follows:

Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the “Tool to calculate the emission factor for an electricity system” ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$).

Thus, the project emission is calculated as following:

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

Where:

- $EC_{PJ1,y}$ = quantity of electricity consumed from the grid by the project activity during the year y (MWh);
- $EF_{grid,CM,y}$ = the emission factor for the grid in year y (tCO₂/MWh);
- TDL_y = average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site.

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

As electricity will be consumed from diesel generators (off-grid captive power plant), a conservative approach was adopted and the option B2 of the scenario B was chosen because: "The electricity consumption source is a project or leakage electricity consumption source". Therefore, the value used will be 1.3 tCO₂/MWh for project emission from diesel generator(s).

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

Where:

- $EC_{PJ2,y}$ = quantity of electricity consumed from diesel generator by the project activity during the year y (MWh);
- $EF_{diesel_generator,y}$ = the emission factor for the diesel generator in year y (tCO₂/MWh);
- TDL_y = average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site.

Calculation of $PE_{FC,y}$ – project emission from consumption of heat

The consumption of heat will be provided by the burning of liquefied petroleum gas (LPG) from pilot flames of the flares.

According to "Tool to calculate project of leakage CO₂ emissions from fossil fuel combustion", the equation is:

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

Where:

$PE_{FC,j,y}$ is the CO₂ emissions from LPG combustion in flares during the year y (tCO₂/yr);

$FC_{i,j,y}$ is the quantity of LFG combusted in pilot flames of flares during year y (mass /yr); and

$COEF_{i,y}$ is the CO₂ emission coefficient of LPG in year y (tCO₂/mass).

In Brazil, there is data about chemical composition in diesel invoices. Therefore, option B was chosen for calculation of $COEF_{i,y}$.

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

Where:

- $NCV_{i,y}$ is the weighted average net caloric value of fuel type i in year y (GJ/mass); and
- $EF_{CO2,i,y}$ is the weighted average emission factor of fuel type i in year y (tCO₂/GJ).

Calculation of $PE_{SP,y}$ – from the supply of LFG to consumers through a dedicated pipeline

Project emissions from the supply of LFG to consumers through a dedicated pipeline ($PE_{SP,y}$) is determined by possible leaks during the transportation of LFG to the consumer through a dedicated pipeline, as follows:

$$PE_{SP,y} = 0.0504 \times DEFTSP,y \times F_{CH4,NG,y}$$

Where:

$PE_{SP,y}$ = Project emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (tCO₂/yr)

$DEFTSP,y41$ Default emission factor from the supply of LFG to consumers through a dedicated pipeline (tCO₂/TJ)

FCH_4,NGy Amount of methane in the LFG which is sent to the consumer through a dedicated pipeline in year y (tCH₄/yr)

Leakage:

In accordance with the ACM0001, no leakage effects need to be accounted.

Emission Reduction

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y,$$

Where:

ER_y = Emission reductions in year y (tCO₂e/yr);

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

PE_y = Project emissions in year y (tCO₂e/yr);

Enclosed flare(s) will be installed in the project activity to increase the destruction efficiency. Those flares reach 98%⁴² (minimum) of methane destruction efficiency.

For SDG 7:

⁴¹ This default value (0.6 × 10⁻⁶) was based on Tool 15 - Upstream leakage emissions associated with fossil fuel use, Table 4, in item – Transport mode: Pipeline (Natural gas distribution).

⁴² Since flare efficiency is monitored according to Option B.1: Biannual measurement and flare design is considered as low height flare, flare efficiency discount in ERs calculations is 15%

The baseline for the project is the consumption of natural gas. The project exports LFG selling to consumers through a dedicated pipeline. The project is expected to export 61,565,362 N.m³ of methane per year. The measurement method consists in continuous measurements by flow meters of exported LFG.

For SDG 5:

The project contributes to the increase of the quantity of women in managerial positions by presenting at least one woman in project leadership and decision-making positions by showing signed company functional organizational chart every year.

For SDG 8:

The project contributes to the SDG target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. Based on project onsite employees Social Records. This is achieved by showing the number of onsite employee as the total number of jobs.

For Safeguarding Principle 3:

The project activity contributes to avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community. The project counts with valid operational license issued by the Local Environmental Agency. This is achieved by showing the Environmental Permits.

For Safeguarding Principle 6.1:

The project developer does not complicit in any form of forced or compulsory labour. All employees offering their services on a voluntary basis and are free to quit the services at any time without a menace or penalty. The project participants are committed to apply safe and healthy working conditions during the lifetime of the project. All employees of the project are protected by the Consolidation of Labour Laws. This is achieved by showing the number of onsite employees as the total number of jobs.

B.6.2 Data and parameters fixed ex ante

Relevant SDG Indicator	SDG 13.2.1
------------------------	------------

	SDG 7
Data/parameter	$EF_{grid,BM,2018}$
Unit	tCO ₂ /MWh
Description	Build margin emission factor of the Brazilian grid
Source of data	Calculations based on parameters described above.
Value(s) applied	0.1370
Choice of data or Measurement methods and procedures	The build margin emission factor has been defined by the Brazilian DNA
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
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", were included in the monitoring plan. 2018 Build Margin from DNA is the most recent data, thus used in this parameter. For more details, see Annex 3.

Relevant SDG Indicator	SDG 13.2.1
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 methodological tool "Emissions from solid waste disposal sites"
Value(s) applied	0.1

Choice of data or Measurement methods and procedures	Default value used, according to ACM0001
Purpose of data	Calculation of baseline emission
Additional comment	Applicable to Step A

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	GWP _{CH4}
Unit	tCO ₂ e/tCH ₄
Description	Global warming potential of CH ₄
Source of data	IPCC
Value(s) applied	28 updated as per Applicability of Global Warming Potential for Gold Standard for the Global Goals Projects available at https://globalgoals.goldstandard.org/standards/RU-2020-PR-V1.2-GWP-values.pdf .
Choice of data or Measurement methods and procedures	Default value used, according to IPCC Fourth Assessment Report: Climate Change 2007, item 2.10.2: Direct Global Warming Potentials, Table 2.14
Purpose of data	Calculation of baseline emission
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	NCV _{CH4}
Unit	TJ/t CH ₄
Description	Net calorific value of methane at reference conditions
Source of data	Technical literature
Value(s) applied	0.0504

Choice of data or Measurement methods and procedures	-
Purpose of data	-
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	R_u
Unit	Pa.m ³ /kmol.K
Description	Universal ideal gas constant
Source of data	Methodological tool "Project emissions from flaring"
Value(s) applied	0.008314472
Choice of data or Measurement methods and procedures	Default value used, according to Methodological tool "Project emissions from flaring", table 1: Constants used in equations
Purpose of data	Calculation of baseline emission
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1						
Data/parameter	Waste composition						
Unit	%						
Description	Waste composition						
Source of data	landfill internal studies						
Value(s) applied	<table border="1"> <thead> <tr> <th colspan="2">Composition of waste</th></tr> </thead> <tbody> <tr> <td>A) Wood and wood products</td><td>1.88%</td></tr> <tr> <td>B) Pulp, paper and cardboard (other than sludge)</td><td>11.60%</td></tr> </tbody> </table>	Composition of waste		A) Wood and wood products	1.88%	B) Pulp, paper and cardboard (other than sludge)	11.60%
Composition of waste							
A) Wood and wood products	1.88%						
B) Pulp, paper and cardboard (other than sludge)	11.60%						

	C) Food, food waste, beverages and tobacco (other than sludge)	47.41%
	D) Textiles	6.63%
	E) Garden, yard and park waste	0.00%
	F) Glass, plastic, metal, other inert waste	32.47%
	TOTAL	100.00%
Choice of data or Measurement methods and procedures	Internal Report	
Purpose of data	Calculation of baseline emission	
Additional comment	Used for projection of methane avoidance	

Relevant SDG Indicator	SDG 13.2.1										
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	<table><tr><td>Flare model</td><td>3000 HT (ZULE® 13' x 60')</td></tr><tr><td>Minimum flare temperature</td><td>649 °C</td></tr><tr><td>Maximum flare temperature</td><td>1093 °C</td></tr><tr><td>Minimum and maximum inlet flow rate</td><td>Minimum flow: 750 Nm³/h --- Maximum flow: 9.600 Nm³/h</td></tr></table>			Flare model	3000 HT (ZULE® 13' x 60')	Minimum flare temperature	649 °C	Maximum flare temperature	1093 °C	Minimum and maximum inlet flow rate	Minimum flow: 750 Nm ³ /h --- Maximum flow: 9.600 Nm ³ /h
Flare model	3000 HT (ZULE® 13' x 60')										
Minimum flare temperature	649 °C										
Maximum flare temperature	1093 °C										
Minimum and maximum inlet flow rate	Minimum flow: 750 Nm ³ /h --- Maximum flow: 9.600 Nm ³ /h										

	Maximum duration in days between maintenance events	N/A ⁴³
Choice of data or Measurement methods and procedures	Calculation of project emissions	
Purpose of data	-	
Additional comment	SPEC _{flare}	

Relevant SDG Indicator	SDG 13.2.1	
Data/parameter	P _{ref}	
Unit	Pa	
Description	Atmospheric pressure at reference conditions	
Source of data	Tool "Project emissions from flaring"	
Value(s) applied	101,325	
Choice of data or Measurement methods and procedures	Default value extracted from Tool "Project emissions from flaring"	
Purpose of data	Calculation of project emissions	
Additional comment	-	

Relevant SDG Indicator	SDG 13.2.1	
Data/parameter	T _{ref}	

⁴³ The maximum duration in days between maintenance events by the equipment manufacturer is not available. Thus, the number of maintenance events completed in a determined year has been chosen considering preventive maintenance program which defines the frequency for checking flare equipment situation continuously every day.

Unit	K
Description	Temperature at reference conditions
Source of data	Tool "Project emissions from flaring"
Value(s) applied	273.15
Choice of data or Measurement methods and procedures	Default value extracted from Tool "Project emissions from flaring"
Purpose of data	Calculation of project emissions
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	η_{PJ}
Unit	Dimensionless
Description	Efficiency of the LFG capture system that is be installed in the project activity
Source of data	A Landfill Gat-to-Energy Project Development Handbook. USEPA 1996 Handbook EPA-LFG.
Value(s) applied	85%
Choice of data or Measurement methods and procedures	Based on the active LFG capture system installed in the project activity.
Purpose of data	Calculation of baseline emission
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	Φ_{default}
Unit	-

Description	Default value for the model correction factor to account for model uncertainties
Source of data	Tool "Emissions from solid waste disposal sites"
Value(s) applied	0.75
Choice of data or Measurement methods and procedures	According to "Emissions from solid waste disposal sites", the <i>Application A</i> was used because the landfill is an existing solid waste disposal site and in the project activity the methane emissions are being mitigated by capturing and flaring the methane (ACM0001).
Purpose of data	Calculation of baseline emission
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	OX
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	Default value used according to "Emissions from solid waste disposal sites"
Purpose of data	Calculation of baseline emission
Additional comment	When methane passes through the top-layer, part of it is oxidized by methanotrophic bacteria to produce CO ₂ . The oxidation factor represents the proportion of methane that is oxidized to CO ₂ . This should be distinguished from the methane correction factor (MCF) which is to account for the situation that ambient air might intrude into the SWDS

	and prevent methane from being formed in the upper layer of SWDS.
--	---

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	F
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value used according to "Emissions from solid waste disposal sites"
Purpose of data	Calculation of baseline emission
Additional comment	Upon biodegradation, organic material is converted to a mixture of methane and carbon dioxide

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	DOC _{f,default}
Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	The default value was used for type Application A). according to "Emissions from solid waste disposal sites"

Purpose of data	Calculation of baseline emission
Additional comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can be used for Application A.

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	MCF _{default}
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	1.0
Choice of data or Measurement methods and procedures	The project activity is an anaerobic managed solid waste disposal site with controlled placement of waste (i.e. waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and is include: (i) cover material; (ii) mechanical compacting and (iii) leveling of the waste;
Purpose of data	Calculation of baseline emission
Additional comment	-

Relevant SDG Indicator	SDG 13.2.1		
Data/parameter	DOC _j		
Unit	-		
Description	Fraction of degradable organic carbon in the waste type j (weight fraction)		
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)		
Value(s) applied	<table border="1"> <tr> <td>Waste type j</td><td>DOC_j</td></tr> </table>	Waste type j	DOC _j
Waste type j	DOC _j		

		(% wet waste)
	Wood and wood products	43%
	Pulp, paper and cardboard (other than sludge)	40%
	Food, food waste, beverages and tobacco (other than sludge)	15%
	Textiles	24%
	Garden, yard and park waste	20%
	Glass, plastic, metal, other inert waste	0%
Choice of data or Measurement methods and procedures	IPCC default value for municipal solid waste (MSW) disposal site is applied.	
Purpose of data	Calculation of baseline emission	
Additional comment	-	

Relevant SDG Indicator	SDG 13.2.1											
Data/parameter	k_j											
Unit	-											
Description	Decay rate for waste type j											
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories											
Value(s) applied	<table><tr><th colspan="2" rowspan="2">Waste type j</th><th>Tropical (MAT > 20 °C)</th></tr><tr><th>Wet (MAP > 1,000mm)</th></tr><tr><td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.07</td></tr><tr><td>Wood, wood products and straw</td><td>0.035</td></tr></table>			Waste type j		Tropical (MAT > 20 °C)	Wet (MAP > 1,000mm)	Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.07	Wood, wood products and straw	0.035
Waste type j		Tropical (MAT > 20 °C)										
		Wet (MAP > 1,000mm)										
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.07										
	Wood, wood products and straw	0.035										

	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.17
	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.4
Choice of data or Measurement methods and procedures	IPCC default value for anaerobic managed solid waste disposal site is applied.		
Purpose of data	Calculation of baseline emissions		
Additional comment	Used for projection of methane avoidance. The climate data was provided to Rainfall index database from São Paulo city – Station: E3-243 (http://www.sigrh.sp.gov.br/cgi-bin/bdhtm.exe/plu?qwe=qwe). And the temperature data was provided to CIIAGRO (http://www.ciiagro.sp.gov.br/ciiagroonline/Quadros/QTmedPeriodo.asp)		

Relevant SDG Indicator	SDG 13.2.1								
Data/parameter	MM _i								
Unit	kg/kmol								
Description	Molecular mass of greenhouse gas i								
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream								
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	According to “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”								
Purpose of data	Calculation of baseline emissions								

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

Relevant SDG Indicator	SDG 13.2.1								
Data/parameter	MM _k								
Unit	kg/kmol								
Description	Molecular mass of gas <i>k</i>								
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream								
Value(s) applied	<table><tr><th>Compound</th><th>Structure</th><th>Molecular mass (kg/kmol)</th></tr><tr><td>Nitrogen</td><td>N₂</td><td>28.01</td></tr></table>			Compound	Structure	Molecular mass (kg/kmol)	Nitrogen	N ₂	28.01
Compound	Structure	Molecular mass (kg/kmol)							
Nitrogen	N ₂	28.01							
Choice of data or Measurement methods and procedures	According to “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”								
Purpose of data	Calculation of baseline emissions								
Additional comment	-								

Relevant SDG Indicator	SDG 13.2.1
Data/parameter	MM _{H₂O}
Unit	kg/kmol
Description	Molecular mass of water
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value(s) applied	18.0152
Choice of data or Measurement methods and procedures	According to "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
Purpose of data	Calculation of baseline emissions

Additional comment	-
Relevant SDG Indicator	SDG 13.2.1
Data/parameter	$DEFT_{SP,Y}$
Unit	tCO ₂ /TJ
Description	Default emission factor from the supply of LFG to consumers through a dedicated pipeline
Source of data	This default value was based on Tool 15 - Upstream leakage emissions associated with fossil fuel use ,Appendix, Table 1, page 19 (Natural gas distribution).
Value(s) applied	2.2
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	Conservatively, it was used the highest value from Table 4 to include as default emission factor.

B.6.3 Ex ante estimation of SDG Impact

>>

Emission reduction (SDG 13 and SDG 07)

Baseline emission calculation

The total of methane generation at the site has been estimated based on the waste tonnage of the landfill using the first order decay model presented in the "*Emissions from solid waste disposal sites*" and considering the following equation as mentioned previously.

Ex-ante estimation of $F_{CH_4,PJ,Y}$

The assumptions used to calculate $F_{CH_4,PJ,y}$ are:

- Methane content in LFG = 50% (default value);
- LFG collection efficiency = 85%: (Based on the Handbook from USEPA 1996 EPA-LFG "A Landfill Gas-to-Energy Project Development Handbook" and the active LFG capture system installed in the project activity);
- Density of methane = 0.716 kg/m³ (as per tool "Project emissions from flaring").

The landfill gas collection and utilization system will capture only a portion of the generated landfill gas. Thus, an estimate of 85% LFG collection was applied to the estimate of LFG produced, under assumption that generated LFG is composed of 50% methane.

The ex-ante estimation of the $F_{CH_4,PJ,y}$ is presented below:

$$F_{CH_4,PJ,y} = \eta_{PJ} \times \frac{BE_{CH_4,SWDS,y}}{GWP_{CH_4}}$$

Where:

$F_{CH_4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (tCH ₄ /yr)
$BE_{CH_4,SWDS,y}$	=	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (tCO ₂ e/yr)
η_{PJ}	=	Efficiency of the LFG capture system that will be installed in the project activity
GWP_{CH_4}	=	Global warming potential of CH ₄ (tCO ₂ e/tCH ₄)

The table below illustrates the ex-ante estimation of $F_{CH_4,PJ,y}$ by the project activity during the crediting period.

Table 11 – Ex-ante estimation of $F_{CH_4,PJ,y}$

Year	$F_{CH_4,PJ,y}$ (tCH ₄ /yr)
------	---

From 01/04/2025	35,195
2026	46,807
2027	46,992
Until 31/03/2028	11,565

Determination of $F_{CH_4,BL,y}$

Table 12 – Ex-ante estimation of $F_{CH_4,BL,y}$

Year	$F_{CH_4,BL,y}$ (tCH ₄ /yr)
From 01/04/2025	7,039
2026	9,361
2027	9,398
Until 31/03/2028	2,313

Step (A): Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$)

The equation of the $BE_{CH_4,y}$ is:

$$BE_{CH_4} = \left((1 - OX_{top_layer}) \times F_{CH_4,PJ,y} - F_{CH_4,BL,y} \right) \times GWP_{CH_4}$$

Where the $OX_{top_layer} = 0.1$ (default value) and $F_{CH_4,PJ,y}$ and $F_{CH_4,BL,y}$ are calculated above. The results are presented below:

Table 13 – Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$)

Year	$BE_{CH_4,y}$ (tCO ₂ /year)
From 01/04/2025	689,815
2026	917,414
2027	921,041
Until 31/03/2028	226,672

Step (B): Baseline emissions associated with electricity generation ($BE_{EC,y}$)

The ex-ante calculation is:

$$BE_{EC,y} = EC_{BL,k,y} \times EF_{grid,CM,y} \times (1+TDL_y)$$

As explained above, there is no electricity generation. Thus, $EC_{BL,k,y}=0$ and $BE_{EC,y}=0$.

Table 14 –Baseline emissions associated with electricity generation ($BE_{EC,y}$)

Year	$EC_{BL,k,y}$ (MWh/yr)	$BE_{EC,y}$ (tCO ₂ /yr)
From 01/04/2025	0	0
2026	0	0
2027	0	0
Until 31/03/2028	0	0

Step (C): Baseline emissions associated with natural gas use ($BE_{NG,y}$)

The ex-ante calculation is:

$$BE_{NG,y} = 0.0504 \times F_{CH_4,NG,y} \times EF_{CO_2,NG,y}$$

Where the $EF_{CO_2,NG,y} = 58.3 \text{ tCO}_2/\text{TJ}$ and $F_{CH_4,NG,y}$ is calculated below. The results are presented below:

Table 15 –Baseline emissions associated with natural gas use ($BE_{NG,y}$)

Year	$F_{CH_4,NG}$ (tCH ₄ /yr)	$BE_{NG,y}$ (tCO ₂ /yr)
From 01/04/2025	33,211	97,584
2026	44,080	129,520
2027	44,080	129,520
Until 31/03/2028	11,020	32,380

The equation of the baseline emission calculation is:

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

The result is:

Table 16 –Baseline emission calculation

Year	$BE_{CH_4,y}$ (tCO ₂ /year)	$BE_{NG,y}$ (tCO ₂ /yr)	BE_y (tCO ₂ /yr)
From 01/04/2025	689,815	97,584	787,399
2026	917,414	129,520	1,046,935
2027	921,041	129,520	1,050,562
Until 31/03/2028	226,672	32,380	259,052

1. Project emission

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

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)
$PE_{FC,y}$	=	Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (tCO ₂ /yr)

There is no consumption of fossil fuels due to the project activity for purpose other than electricity generation, in year y (tCO₂/yr), therefore $PE_{FC,y} = 0$

Thus,

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

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

The project emission from consumption of electricity is:

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

Where:

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

In the option A1 of the “Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, states that a value of the combined margin emission factor ($EF_{grid,CM,y}$) may be used as the emission factor ($EF_{Elj/k/l,y}$) Therefore a value of 0.2375 tCO₂/MWh will be used.

Finally, the technical transmission and distribution losses ($TDL_{j,y}$) value has been assumed to be 26.3 %, according to Brazilian National Energy Balance – Base year 2019⁴⁴. Table below summarizes the project emissions resulting from electrical consumption in the plant.

Table 17 – Electricity consumption from the grid resulting due to project activity

Year	Electricity consumption from the grid (MWh/year)	$PE_{el,grid}$ (tCO ₂ /year)
From 01/04/2025	1,563	437
2026	1,563	437
2027	1,563	437
Until 31/03/2028	1,563	437

$PE_{EC2,y}$ - Project emission from diesel generator(s)

⁴⁴ Brazilian National Energy Balance (26.3% for 2019 is the most recent data) Source: https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-479/topico-521/Relato%CC%81rio%20Si%CC%81ntese%20BEN%202020-ab%202019_Final.pdf, available on 15/07/2024.

There is no foreseen the consumption of diesel by the diesel generator since the electricity consumption will come from the grid in order to supply the LFG plant internal needs. The emission factor from the diesel generator(s) is 1.3 tCO₂/MWh. The following table represents the project emissions from the use of the standby generator, associated with fossil fuel combustion at the project site over the crediting period.

Table 18 – Project emissions from diesel generator

Year	PE _{el,diesel} (MWh/year)	PE _{el,diesel} (tCO ₂ /year)
From 01/04/2025	0	0
2026	0	0
2027	0	0
Until 31/03/2028	0	0

Calculation of PE_{FC,y} – project emission from consumption of heat

For ex-ante calculation, this factor was considered zero because there is no estimation from LPG consumption in pilot flames of flares.

$$PE_{FC,y} = 0$$

Calculation of PE_{SP,y} – Project emissions from the supply of LFG to consumers through a dedicated pipeline

$$PE_{SP,y} = 0.0504 \times DEFT_{SP,y} \times F_{CH4,NG,y}$$

Where:

$PE_{SP,y}$ = Project emissions from the supply of LFG to consumers due to physical leakage from the dedicated pipeline, in year y (tCO₂/yr)

$DEFT_{SP,y}$ ⁴⁵ = Default emission factor for the supply of LFG to consumers due to physical leakage through the dedicated pipeline (tCO₂e/TJ)

$F_{CH4,NGy}$ = Amount of methane in the LFG which is sent to the consumer through a dedicated pipeline in year y (tCH₄/yr)

Year	$F_{CH4,NG-1,y}$ (tCH ₄ /yr)	$F_{CH4,NG-2,y}$ (tCH ₄ /yr)	$F_{CH4,NG-3,y}$ (tCH ₄ /yr)	$PE_{SP,y}$ (tCO ₂ /year)
From 01/04/2025	19,926	3,321	9,963	3,682
2026	26,448	4,408	13,224	4,888
2027	26,448	4,408	13,224	4,888
Until 31/03/2028	6,612	1,102	3,306	1,222

2. Leakage:

No leakage effects need to be accounted under methodology ACM0001.

3. Emission reduction

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

⁴⁵ This default value (2.2 tCO₂e/TJ) is based on Tool 15 - Upstream leakage emissions associated with fossil fuel use, Appendix, Table 1, page 19 (Natural gas distribution).

ER_y = Emission reductions in year y (tCO₂e/yr);
 BE_y = Baseline emissions in year y (tCO₂e/yr);
 PE_y = Project emissions in year y (tCO₂e/yr);

Year	BE _y (tCO ₂)	PE _y (tCO ₂)	ER _y (tCO ₂)
From 01/04/2025	787,399	4,012	783,387
2026	1,046,935	5,325	1,041,610
2027	1,050,562	5,325	1,045,237
Until 31/03/2028	259,052	1,659	257,393

For SDG 4:

30 person attending Quality Education events

For SDG 5:

1 woman in managerial positions

For SDG 8:

10 Job

For SDG 7:

61,565,362N.m³ of LFG selling/year

For SDG 13:

1,042,542 tCO₂e/year

B.6.4 Summary of ex ante estimates of each SDG Impact

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
From 01/04/2025	787,399	4,012	783,387
2026	1,046,935	5,325	1,041,610
2027	1,050,562	5,325	1,045,237
Until 31/03/2028	259,052	1,659	257,393
Total	3,143,948	16,320	3,127,627
Total number of crediting years	3	3	3
Annual average over the crediting period	1,047,983	5,440	1,042,542

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

Baseline, project and/or leakage emission from electricity consumption and monitoring of electricity generation

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
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	Brazilian DNA
Value(s) applied	0.2146
Measurement methods and procedures	The emission factor is calculated ex-post, as the weighted average of the dispatch data analysis OM (Operating Margin) and the BM (Build margin), as described in B.6.3.
Monitoring frequency	Annual

QA/QC procedures	Apply procedures in the "Tool to calculate the emission factor for an electricity system"
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
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", were included in the monitoring plan. Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: • <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1

Data / Parameter	EF _{grid,OM,y}
Unit	tCO ₂ /MWh
Description	Operating margin emission factor of the Brazilian grid
Source of data	Calculations based on parameters described above.
Value(s) applied	0.4473
Measurement methods and procedures	The operating margin emission factor is calculated ex-post, as described in B.6.3.
Monitoring frequency	Annual
QA/QC procedures	Apply procedures in the "Tool to calculate the emission factor for an electricity system"
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
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", were included in the monitoring plan. Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change,</i>

	<i>and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).</i>
--	---

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	TDL_y
Unit	-
Description	Average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site.
Source of data	National Energy Balance
Value(s) applied	30.3%
Measurement methods and procedures	For (a): $TDL_{j/k/l,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation
Monitoring frequency	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years
QA/QC procedures	-
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;

Additional comment	• The data was based National Energy Balance .⁴⁶ Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--------------------	--

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	$EC_{PJ1,y} = EG_{EC1,y}$
Unit	MWh/y

⁴⁶ National Energy Balance (26.3% for 2019 Base year, page 15) Source: https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-479/topico-521/Relato%CC%81rio%20Si%CC%81ntese%20BEN%202020-ab%202019_Final.pdf, available on 15/07/2024.

Description	Quantity of electricity consumed from the grid by the project activity during the year y;										
Source of data	Measurement from Project participants.										
Value(s) applied	<table border="1"> <thead> <tr> <th>Year</th><th>EC_{PJ1,y} (MWh/year)</th></tr> </thead> <tbody> <tr> <td>From 01/04/2025</td><td>1,563</td></tr> <tr> <td>2026</td><td>1,563</td></tr> <tr> <td>2027</td><td>1,563</td></tr> <tr> <td>Until 31/03/2028</td><td>1,563</td></tr> </tbody> </table>	Year	EC _{PJ1,y} (MWh/year)	From 01/04/2025	1,563	2026	1,563	2027	1,563	Until 31/03/2028	1,563
Year	EC _{PJ1,y} (MWh/year)										
From 01/04/2025	1,563										
2026	1,563										
2027	1,563										
Until 31/03/2028	1,563										
Measurement methods and procedures	Continuously measured by electricity meters for the grid electricity consumption as per the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" and methodology ACM0001.										
Monitoring frequency	Continuously										
QA/QC procedures	As per the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"										
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;										
Additional comment	- The data will be archived throughout the crediting period and two years thereafter. Since this parameter is related to project renewable energy generation and consumption, it contributes to: <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission										

	reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	--

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1										
Data / Parameter	$EC_{PJ2,y} = EG_{EC2,y}$										
Unit	MWh/y										
Description	Quantity of electricity consumed from diesel generator by the project activity during the year y										
Source of data	Measurement from Project participants.										
Value(s) applied	<table> <tr> <th>Year</th><th>$PE_{el,diesel}$ (MWh/year)</th></tr> <tr> <td>From 01/04/2025</td><td>0</td></tr> <tr> <td>2026</td><td>0</td></tr> <tr> <td>2027</td><td>0</td></tr> <tr> <td>Until 31/03/2028</td><td>0</td></tr> </table>	Year	$PE_{el,diesel}$ (MWh/year)	From 01/04/2025	0	2026	0	2027	0	Until 31/03/2028	0
Year	$PE_{el,diesel}$ (MWh/year)										
From 01/04/2025	0										
2026	0										
2027	0										
Until 31/03/2028	0										
Measurement methods and procedures	Continuously measured by electricity meters for the diesel generators as per "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" and ACM0001 methodology.										
Monitoring frequency	Continuously										

QA/QC procedures	As per the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
Additional comment	- The data will be archived throughout the crediting period and two years thereafter. Since this parameter is related to project renewable energy generation and consumption, it contributes to: <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	EF _{CO2,NG,y}

Unit	tCO ₂ /TJ
Description	Average CO2 emission factor of natural gas in the natural gas network or dedicated pipeline or in the trucks in year y
Source of data	2006 IPCC Guidelines on National GHG Inventories. Value at the upper limit of the uncertainty at a 95% confidence interval.
Value(s) applied	58.3
Measurement methods and procedures	Not applicable since IPCC default value is used.
Monitoring frequency	Any future revisions of the IPCC Guidelines should be taken into account.
QA/QC procedures	Not applicable since IPCC default value is used.
Purpose of data	(b) Calculation of baseline emissions or actual net GHG removals by sinks;
Additional comment	Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation</i>

	<i>plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	$FC_{i,j,y}$
Unit	kg
Description	Quantity of LPG combusted in pilot flames of flares during year y.
Source of data	Invoices of LPG suppliers.
Value(s) applied	0
Measurement methods and procedures	The mass of LPG purchased by the project developer will be stated in the invoices issued by the LPG supplier. Hard copies of the invoices will be kept in files during the crediting period and two years after.
Monitoring frequency	Continuously
QA/QC procedures	Scope of the LPG supplier.
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
Additional comment	Where such data is not available, IPCC data will be used in a conservative manner. Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission

	reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	---

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1								
Data / Parameter	EF _{CO2,LPG,y}								
Unit	-								
Description	Weighted average CO ₂ emission factor of LFG in year y								
Source of data	The following data sources may be used if the relevant conditions apply: <table> <tr> <th>Data source</th><th>Conditions for using the data source</th></tr> <tr> <td>a) Values provided by the fuel supplier in invoices.</td><td>This is the preferred source.</td></tr> <tr> <td>b) Measurements by the project participants.</td><td>If a) is not available.</td></tr> <tr> <td>c) Regional or national default values.</td><td>If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable</td></tr> </table>	Data source	Conditions for using the data source	a) Values provided by the fuel supplier in invoices.	This is the preferred source.	b) Measurements by the project participants.	If a) is not available.	c) Regional or national default values.	If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable
Data source	Conditions for using the data source								
a) Values provided by the fuel supplier in invoices.	This is the preferred source.								
b) Measurements by the project participants.	If a) is not available.								
c) Regional or national default values.	If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable								

		sources (such as national energy balances).
	d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.	If a) is not available.
Value(s) applied	n/a	
Measurement methods and procedures	For a) and b) Measurements should be undertaken in line with national or international fuel standards.	
Monitoring frequency	-	
QA/QC procedures	For a) and b): The CO₂ emission factor will be obtained for each fuel delivery, from which weighted average annual values should be calculated. For c): Review appropriateness of the values annually. For d): Any future revision of the IPCC Guidelines should be taken into account	
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;	
Additional comment	Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to:	

	<i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	--

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	NCV _{fuel,y}
Unit	GJ per mass (GJ/ton)
Description	Weighted average net calorific value of fossil fuel i in year y
Source of data	Regional or national default values
Value(s) applied	46.4 for LPG ⁴⁷
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards. Monitoring frequency: Review appropriateness of the values annually
Monitoring frequency	Continuously
QA/QC procedures	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information

⁴⁷Assuming 11,100 kcal/kg converted to 46.4 GJ/ton
(1 kcal = 4.184*10⁻⁶ GJ and 1 kg = 10⁻³ ton)

	from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
Additional comment	- The value was based on Table VIII.9 of Brazilian Energy Balance -BEN 2025 (most updated base year 2024)⁴⁸. Since this parameter is related to project renewable energy generation and consumption, it contributes to: <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

⁴⁸Source: <https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/balanco-energetico-nacional-2025>

ACM0001: Flaring or use of landfill gas

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	Management of SWDS
Unit	-
Description	Management of SWDS
Source of data	Use different sources of data: - Original design of the landfill; - Technical specifications for the management of the SWDS; - Local or national regulations
Value(s) applied	-
Measurement methods and procedures	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: • <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	$O_{pj,h}$
Unit	-
Description	Operation of the equipment that consumes the LFG
Source of data	Measurements by Project participant using a device integrated with the operational software at the landfill gas plant.
Value(s) applied	n/a
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 three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PDD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnances. This option is not applicable to brick kilns. $O_{pj,h}=0$ when: (a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute);

	(b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute); (c) No products are generated in the hour h. Otherwise, $Op_{j,h}=1$
Monitoring frequency	Once per minute
QA/QC procedures	The calibration of this equipment is not applicable since it is a device integrated with the operational software at the landfill gas plant.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	Since this parameter is related to project renewable energy generation and consumption, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1																													
Data / Parameter	$F_{CH4,NGy}$																													
Unit	tCH ₄ /yr																													
Description	Amount of methane in the LFG which is sent to the costumer through a dedicated pipeline in year y																													
Source of data	-																													
Value(s) applied	Ex-ante estimative <table><tr><th>Year</th><th>$F_{CH4,NG-1,y}$ (tCH₄/yr)</th><th>$F_{CH4,NG-2,y}$ (tCH₄/yr)</th><th>$F_{CH4,NG-3,y}$ (tCH₄/yr)</th><th>$F_{CH4,NGy}$ (tCH₄/yr) Total</th></tr><tr><td>From 01/04/2025</td><td>19,926</td><td>3,321</td><td>9,963</td><td>33,211</td></tr><tr><td>2026</td><td>26,448</td><td>4,408</td><td>13,224</td><td>44,080</td></tr><tr><td>2027</td><td>26,448</td><td>4,408</td><td>13,224</td><td>44,080</td></tr><tr><td>Until 31/03/2028</td><td>6,612</td><td>1,102</td><td>3,306</td><td>11,020</td></tr></table>					Year	$F_{CH4,NG-1,y}$ (tCH ₄ /yr)	$F_{CH4,NG-2,y}$ (tCH ₄ /yr)	$F_{CH4,NG-3,y}$ (tCH ₄ /yr)	$F_{CH4,NGy}$ (tCH ₄ /yr) Total	From 01/04/2025	19,926	3,321	9,963	33,211	2026	26,448	4,408	13,224	44,080	2027	26,448	4,408	13,224	44,080	Until 31/03/2028	6,612	1,102	3,306	11,020
Year	$F_{CH4,NG-1,y}$ (tCH ₄ /yr)	$F_{CH4,NG-2,y}$ (tCH ₄ /yr)	$F_{CH4,NG-3,y}$ (tCH ₄ /yr)	$F_{CH4,NGy}$ (tCH ₄ /yr) Total																										
From 01/04/2025	19,926	3,321	9,963	33,211																										
2026	26,448	4,408	13,224	44,080																										
2027	26,448	4,408	13,224	44,080																										
Until 31/03/2028	6,612	1,102	3,306	11,020																										
Measurement methods and procedures	Determined using the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream																													
Monitoring frequency	Continuous and aggregated annually in case of natural gas distribution network and dedicated pipeline. Determined using the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”																													
QA/QC procedures	-																													
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks; and (b) Calculation of project emissions or actual net GHG removals by sinks;																													
Additional comment	$F_{CH4,NG-1,y}$, $F_{CH4,NG-2,y}$ and $F_{CH4,NG-3,y}$ refers to methane sent to consumer 1, 2 and 3, respectively. Since this parameter is related to project renewable energy generation and consumption, it contributes to:																													

- *Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology*
- *Indicator 7.2.1: Renewable energy share in the total final energy consumption*

Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to:

Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)

Tool to determine the mass flow of a greenhouse gas in a gaseous stream

Relevant SDG Indicator	SDG 7.1.2 / 7.2.1 SDG 13.2.1
Data / Parameter	$V_{t,db}$
Unit	m ³ /h
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis
Source of data	Measurements by Project participants using a flow meter(s)
Value(s) applied	n/a
Measurement methods and procedures	The volumetric flow rate of the residual gas which is sent to each individual flare, LFG engines and dedicated export pipeline in the hour h will be measured by the installed

	flow meters with digital recordable electronic signal, according to the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”, the measurement option in the project activity will be: • Option (A) dry basis: when the temperature of gaseous stream is lower than 60° C (333.15 K) at the flow measurement point; • Option (B) wet basis: when the temperature of gaseous stream is higher than 60° C (333.15 K) at the flow measurement point;
Monitoring frequency	Continuous recorded and hourly aggregated
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer’s specifications.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	• This parameter will be monitored only in case Option A of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” is applied for the determination of $F_{CH_4,flared,y}$, $F_{CH_4,EL,y}$ and $F_{CH_4,NG,y}$. Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not</i>

	<i>threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	$V_{t,wb}$
Unit	m ³ /h
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis
Source of data	Measurements by Project participants using a flow meter
Value(s) applied	n/a
Measurement methods and procedures	The volumetric flow rate of the residual gas which is sent to each individual flare, LFG engines and dedicated export pipeline in the hour h will be measured by the installed flow meters with digital recordable electronic signal, according to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", the measurement option in the project activity will be: • Option (A) dry basis: when the temperature of gaseous stream is lower than 60°C (333.15 K) at the flow measurement point; • Option (B) wet basis: when the temperature of gaseous stream is higher than 60°C (333.15 K) at the flow measurement point;
Monitoring frequency	Continuous recorded and hourly aggregated
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be in accordance with manufacturer's specifications.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;

Additional comment	This parameter will be monitored only in case Options B or C of the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” is applied for the determination of $F_{CH_4,flared,y}$, $F_{CH_4,EL,y}$ and $F_{CH_4,NG,y}$. Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--------------------	---

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	$V_{i,t,db}$
Unit	m ³ gas i/m ³ dry gas
Description	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis
Source of data	Measurements by Project participants using gas analyzer
Value(s) applied	Approximately 50%
Measurement methods and procedures	Continuous gas analyzer operating in dry basis. Volumetric flow measurement should always refer to the actual pressure and temperature.
Monitoring frequency	Continuous recorded and hourly aggregated
QA/QC procedures	Calibration should include zero verification with an inert gas (e.g. N ₂) and at least one reading verification with a

	standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	This parameter will be monitored only in case Option A of the tool “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” is applied for the determination of $F_{CH_4,flared,y}$, $F_{CH_4,EL,y}$ and $F_{CH_4,NG,y}$ Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	$V_{i,t,wb}$
Unit	m ³ gas i/m ³ dry gas
Description	Volumetric fraction of greenhouse gas i in a time interval t on a wet basis
Source of data	Measurements by Project participants using gas analyzer

Value(s) applied	Approximately 50%
Measurement methods and procedures	Calculated based on the dry basis analysis plus water concentration measurement or continuous in-situ analyzers if not specified in the underlying methodology
Monitoring frequency	Continuous recorded and hourly aggregated
QA/QC procedures	Calibration should include zero verification with an inert gas (e.g. N ₂) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	This parameter may be monitored only in case Option B of the tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" is applied for the determination of $F_{CH_4,flared,y}$, $F_{CH_4,EL,y}$ and $F_{CH_4,NG,y}$ Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Relevant SDG Indicator	SDG 13.2.1
------------------------	------------

Data / Parameter	T_t
Unit	K
Description	Temperature of the gaseous stream in time interval t
Source of data	Measurements by Project participant using a temperature meter
Value(s) applied	n/a
Measurement methods and procedures	Thermoresistance with digital recordable electronic signal will be used. The accuracy and uncertainty of the monitoring instrument will be in accordance with manufacturer specifications.
Monitoring frequency	Continuous
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. The calibration frequency of this monitoring equipment should be according to the manufacturer's specifications
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	• Provided all parameters are converted to normal conditions during the monitoring process, this parameter may not be needed except for moisture content determination and therefore it should be metered only when performing such measurements (with same frequency). However, if the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, this parameter must be monitored continuously to assure the applicability condition is met.

	Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	---

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	P_t
Unit	Pa
Description	Pressure of the gaseous stream in time interval t
Source of data	Measurements by Project participant using a pressure meter
Value(s) applied	n/a
Measurement methods and procedures	Instruments with recordable electronic signal (analogical or digital) will be used. Examples include pressure transducers, etc. The accuracy and uncertainty of the monitoring instrument will be in accordance with manufacturer specifications.
Monitoring frequency	Continuous
QA/QC procedures	Periodic calibration against a primary device must be performed periodically and records of calibration procedures must be kept available as well as the primary

	device and its calibration certificate. Pressure transducers (either capacitive or resistive) must be calibrated monthly. In case the pressure meter is not a capacitive or resistive pressure transducer, the calibration frequency of this monitoring equipment should be according to the manufacturer's specifications.
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	• Provided all parameters are converted to normal conditions during the monitoring process, this parameter may not be needed except for moisture content determination and therefore it should be metered only when performing such measurements (with same frequency) Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	Status of biogas destruction device
Unit	-

Description	Operational status of biogas destruction devices
Source of data	Provided by project participants
Value(s) applied	n/a
Measurement methods and procedures	Monitoring and documenting may be undertaken by recording the energy production from methane captured or the operation of the flare by means of a flame detector to demonstrate the actual destruction of methane, unless a different method is specified in the underlying methodology/tool. Emission reductions will not accrue for periods in which the destruction device is not operational.
Monitoring frequency	Continuous
QA/QC procedures	-
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	For Flame detector devices refer to the methodological tool "Project emissions from flaring". Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 13.2.1

Data / Parameter	$P_{H_2O,t,Sat}$
Unit	Pa
Description	Saturation pressure of H_2O at temperature T_t in time interval t
Source of data	Provided by project participants
Value(s) applied	n/a
Measurement methods and procedures	This parameter is solely a function of the gaseous stream temperature T_t and can be found at reference [1] for a total pressure equal to 101,325 Pa
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	(a) Calculation of baseline emissions or baseline net GHG removals by sinks;
Additional comment	[1] Fundamentals of Classical Thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4th Edition 1994, John Wiley & Sons, Inc. Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation</i>

plan, nationally determined contribution, national communication, biennial update report or other)

Methodological tool "Project emissions from flaring"

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	$F_{CH_4,EG,t}$
Unit	kg
Description	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period t
Source of data	Measurements undertaken by a third party accredited entity
Value(s) applied	-
Measurement methods and procedures	Measures of the mass flow of methane in the exhaust gas carried out according to an appropriate international standard (USEPA). The time period t over which the mass flow is measured must be at least one hour. The average flow rate to the flare during the time period t must be greater than the average flow rate observed for the previous six months. The accuracy and uncertainty characteristics of the monitoring equipment will be under responsibility of the third party accredited entity.
Monitoring frequency	Biannual
QA/QC procedures	According to the standard applied
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
Additional comment	Monitoring of this parameter is required taking into account the LFG combustion in enclosed flares and also project participants selected Option B.1 to determine flare efficiency

	Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	---

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	Flame _m
Unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Source of data	Project Participant
Value(s) applied	-
Measurement methods and procedures	Measurements by project participants using a continuous Ultra Violet flame detector
Monitoring frequency	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off
QA/QC procedures	Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations

Purpose of data	Calculation of baseline and project emissions when the flame is on ⁴⁹ .
Additional comment	Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

Relevant SDG Indicator	SDG 13.2.1
Data / Parameter	Maintenance _y
Unit	Calendar dates
Description	Maintenance events completed in year y
Source of data	Project participants
Value(s) applied	-
Measurement methods and procedures	Record the date that maintenance events were completed in year y. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or

⁴⁹ When the flame is off, neither baseline nor project emissions occurs since the LFG is not combusted and instead released to the atmosphere.

	needing to be replaced, source of replacement parts, serial numbers and calibration certificates
Monitoring frequency	Daily
QA/QC procedures	Records must be kept in a maintenance log for two years beyond the life of the flare
Purpose of data	Calculation of baseline and project emissions when the flame is on ⁵⁰ .
Additional comment	Monitoring of this parameter is required for the case of enclosed flares and the project participant selects Option B to determine flare efficiency. These dates are required so that they can be compared to the maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacturer ($SPEC_{flare}$). Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation</i>

⁵⁰ When the maintenance is being carried out, neither baseline nor project emissions occurs since the LFG is not combusted and released to the atmosphere.

	<i>plan, nationally determined contribution, national communication, biennial update report or other)</i>
Relevant SDG Indicator	SDG 13.2.1
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 project participants
Value(s) applied	-
Measurement methods and procedures	Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 649 °C indicates that a significant amount of gases are still being burnt and that the flare is operating. Data will be recorded continuously and values will be averaged hourly or at a shorter time interval
Monitoring frequency	Once per minute
QA/QC procedures	Thermocouples will be replaced or calibrated every year
Purpose of data	(b) Calculation of project emissions or actual net GHG removals by sinks;
Additional comment	Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not</i>

	<i>threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>
--	---

Relevant SDG Indicator	GSDG-I4.4.1 SDG Target 4
Data / Parameter	Number of people from local community attending company's socioenvironmental activities events. Based on monthly attendance list and/or monthly activities reports
Unit	-
Description	Presents in site activities and speeches containing topics such as Municipal Solid Waste Management, Environmental and human education, Environmental actions such as recycling, Environmental awareness and waste sector labor job valorization.
Source of data	Project Participant: Based on attendance list and/or monthly activities reports
Value(s) applied	-
Measurement methods and procedures	Education Program carried out by Project Participant
Monitoring frequency	At least twice per year
QA/QC procedures	-
Purpose of data	-
Additional comment	Since this parameter is related to disease control and substance abuse treatment, it contributes to: 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship The Company Education Program along with local community, "Ver de Perto" Program, is an environmental

	awareness program by EcoUrbis Ambiental S/A, was developed in compliance with Concession Contract no. 026/SSO/04, entered into in 2004 between EcoUrbis and the Municipality of São Paulo and was implemented during the enterprise's planning stage. It involves residents of the community surrounding the East Waste Treatment Plant - CTL, representatives of organized entities in the region of the undertaking, as well as the municipality of Mauá, and educational institutions. In the scope of the Program several activities are carried out, guided by four methodological axes, which are complementary to each other, as follows: Axis 1 - Knowing the Solid Waste Management System of São Paulo; Axis 2 - Training in Environmental Education and Human Development; Axle 3 - Support to Environmental Actions and Recycling; Axis 4 - Internal Program of Environmental Awareness and Appreciation of the Urban Cleaning Worker and their Families. In the period from January to December 2022, the Program attended 4,351 participants at the Waste Treatment Center East. Considering the history of participation, the activities of the Close Look Program carried out by the Environmental Education team have attended 57,385 people at the CTL since 2008.yyy
--	--

Relevant SDG Indicator	Proposed Monitored Indicator Related to SDG Target 7
Data / Parameter	Amount of methane selling to costumers through dedicated pipeline
Unit	m ³

Description	Amount of methane selling to costumers through dedicated pipeline by the project activity in year y
Source of data	Flow Meter
Value(s) applied	61,495,200 m ³ of methane selling in 2026
Measurement methods and procedures	Monitor the methane amount being sold to costumers
Monitoring frequency	Continuous
QA/QC procedures	Flow meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Purpose of data	-
Additional comment	Since this parameter is related to project renewable energy generation, it contributes to: • <i>Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology</i> • <i>Indicator 7.2.1: Renewable energy share in the total final energy consumption</i> Since this parameter is related to climate change measures in means of a development of a GHG emission reduction project activity authorized by its national Designated National Authority (DNA), it contributes to: <i>Indicator 13.2.1: Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)</i>

	The project activity sold methane to be used for purposes of energy generation and biomethane production.
--	---

Relevant SDG Indicator	Proposed Monitored Indicator Related to SDG Target 5
Data / Parameter	Quantity of women in managerial positions
Unit	-
Description	Refers to number of female management employees (managers) (full - time) at the organization as of the end of the reporting period.
Source of data	Project activity
Value(s) applied	1
Measurement methods and procedures	Signed functional organizational chart showing women leadership and decision-making positions
Monitoring frequency	Once per year
QA/QC procedures	-
Purpose of data	-
Additional comment	Since this parameter is related to gender equality, it contributes to: 5.5: Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

Relevant SDG Indicator	GSDM-I8.5.1 Safeguarding Principles 6.1
Data / Parameter	Total number of jobs.
Unit	-
Description	Refers to total jobs generated as a result of the project.

Source of data	Project participant. Based on: Project onsite employees Social Records.
Value(s) applied	10
Measurement methods and procedures	Carried out by Project Participant "The project shall disclose the following information i. Total number of employees by employment contract (permanent and temporary), by gender. ii. Total number of employees by employment type (full-time and part-time), by gender.
Monitoring frequency	Once per year
QA/QC procedures	-
Purpose of data	-
Additional comment	Since this parameter is related to Decent work and economic growth, it contributes to: 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. Also, the company offers free health assistance to its onsite employees and their familiars. It also provides additional hazard condition bonus.

Relevant SDG Indicator	Safeguarding Principles 3
Data / Parameter	Environmental Permit
Unit	-
Description	Provides Environmental Permit of the Project Activity
Source of data	Project participant. Based on valid Operational License issued by the Local Environmental Agency.
Value(s) applied	1
Measurement methods and procedures	-

Monitoring frequency	yearly
QA/QC procedures	-
Purpose of data	
Additional comment	Since this parameter is related to Community Health, Safety and Working Conditions, it contributes to: • Safeguarding Principle 3

B.7.2 Sampling plan

>>

Not applicable

B.7.3 Other elements of monitoring plan

>>

The monitoring plan will be done according to the methodology ACM0001, the applicable tools, as well as per the paragraph 112 of the CDM project standard. Details are available in section B.7.1 above. The monitoring equipment locations are presented in the picture below:

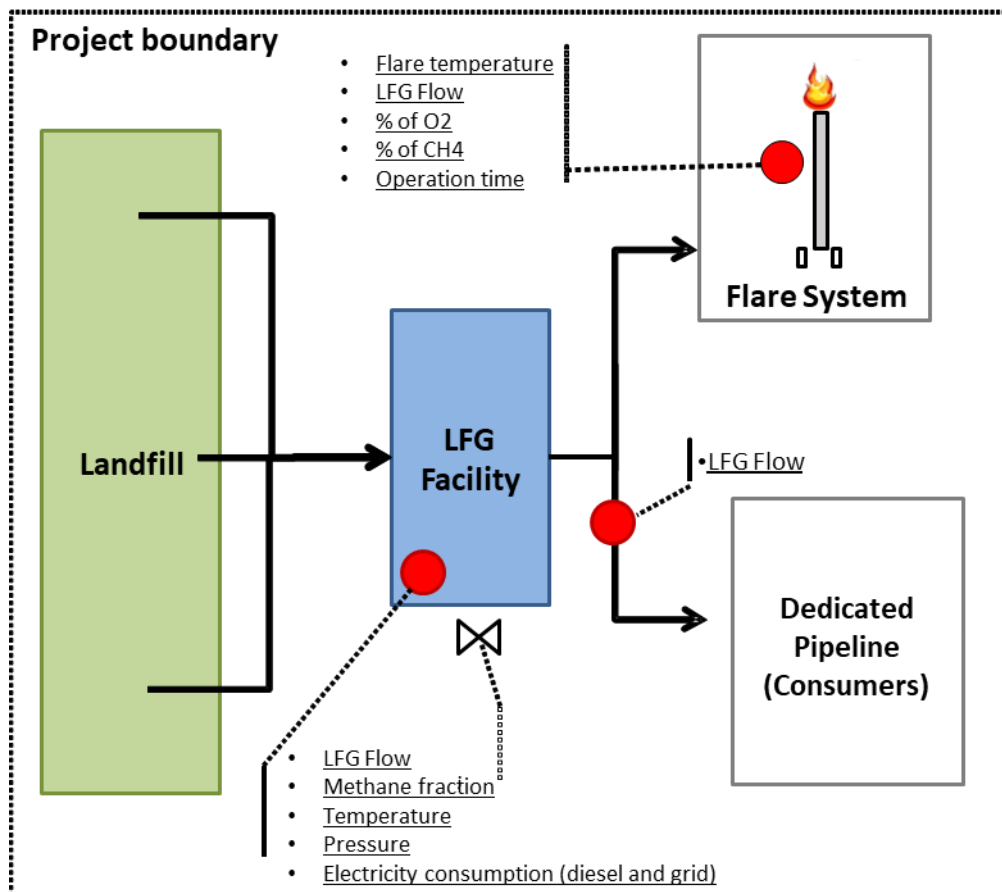


Figure 12 - Monitoring equipment locations

All continuously measured parameters (LFG flow, CH₄ concentration, flare temperature, flare operating hours) are recorded electronically via a datalogger, located within the site boundary which will have the capability to aggregate and print the collected data at the frequencies as specified above. It is the responsibility of the Site Operator to provide all requested data logs which are stored over the duration of the reporting period at the Site office. The data logs are summarized into emission reduction calculations prior to each verification. This task is completed by EcoUrbis and reported directly to the DOE. These logs are available at the request of the DOE in order to prove the operational integrity of the Project.

1. Introduction and Objectives

The two primary purposes of the monitoring plan are:

- To collect the necessary system data required for the determination of emissions reductions; and
- To demonstrate successful compliance with established operating and performance criteria to verify the emission reductions and generate the respective carbon credits.

The operational data that is collected is used to support the periodic verification report that is required for carbon credits auditing. The monitoring plan discussed herein is designed to meet or exceed the UNFCCC requirements (approved monitoring methodology ACM0001)

The routine system monitoring program required for the determination of the emission reductions is discussed in section 2 below, while the additional system data that is collected to ensure the safe, correct, and efficient operation of the LFG management system is discussed in section 3.

2. Training of monitoring personnel

Before commencement of the O&M phase, EcoUrbis will conduct a training and quality control program to ensure that good management practices are carried out and implemented by all project operating personnel in terms of record-keeping, equipment calibration, overall maintenance, and procedures for corrective action. An operations manual exists for the operating personnel. The procedures for filing data and calculations to be performed by the LFG utilization operator is included in a daily log to be placed in the main control room.

3. Monitoring Work Program

The LFG monitoring program is a relatively simple, straight forward program designed to collect system operating data required to safely operate the system and for the verification of carbon credits. This data is collected in real time, and will provide a continuous record that is easy to monitor, review, and validate.

The following sections will outline and discuss the following key elements of the monitoring program:

- Flow measurement;
- Gas quality measurements;
- Uncombusted methane;
- Electrical Consumption;
- LFG supplying;
- Regulatory requirements;
- Data records; and
- Data assessment and reporting.

3.1. Flow Measurement

According to ACM0001, one flow meter is installed on the piping, straight before the flares.

In order to follow ACM0001, two other flow meters are installed: one flow meter is installed in the main piping straight after the blowers to measure the total LFG flow extracted from the landfill; and another flow meters are also installed in the piping leading to consumers through dedicated pipeline, being one flow meter for each LFG consumer.

The flow of LFG collected by the system and subsequently utilized, flared or sent to the consumers through dedicated pipelines are measured via individual flow measuring devices suitable for measuring the velocity and volumetric flow of a gas. One common example is an annubar. The flow measurements are taken within the piping itself, and the flow sensors are connected to transmitters that are capable of collecting and sending continuous data to a recording device such as a datalogger.

The flow sensors are calibrated according to a specified temperature and composition of the gas, thus the flow actually measured must be corrected to according to actual temperature, pressure, and composition, thus density, of the gas measured. The equipment selected will allow dynamic compensation for these parameters, normalized to a standard temperature, pressure, and gas composition. For reporting purposes, the flows are generally required to be normalized to 0°C and 1.01325 bar at standard gas composition of 50% methane and carbon dioxide each by volume.

The accuracy of a flow meter is dependent on the design of the equipment, and the specific type of sensor used, however equipment is available that will provide a minimum accuracy of +/- 2% by volume. The equipment selected for the site utilizes a continuous monitoring system as defined in ACM0001, which measures and aggregates flow data approximately once every two minutes.

3.2. Gas Quality

The two parameters that are most pertinent to the validation of carbon credits, as well as the safe and efficient operation of the system are the concentration of methane and oxygen in the gas stream delivered for utilization or diverted to flaring. These two parameters are measured via a common sample line that is ran to the main collection system piping, and measured in real time by two separate sensors, one for methane and the other for oxygen, installed as per ACM0001.

Regular calibration of the equipment is especially important, as the accuracy of the methane and oxygen sensors is greatest within the expected range of the gas stream to be measured. Equipment is readily available that will provide an accuracy of at least +/- 1% by volume. The equipment selected for the site aggregates gas compositions approximately once every 2 minutes as per the definition of a continuous monitoring system in ACM0001.

3.3. Uncombusted Methane

The efficiency of the enclosed flares is measured per the methodological “Tool to determine project emissions from flaring gases containing methane”.

3.4. Electrical Consumption

The consumed electricity from the grid by the project activity is continuously measured by electricity meters for the grid and diesel generators. The respective data is electronically recorded.

Monthly electrical bills charged to the project are monitored and considered as the actual energy consumption for the project.

3.5. LPG purchased

The mass of LPG purchased by the project developer is stated in the invoices issued by the LPG supplier. For ex-ante calculation, the value of LPG purchased was considered zero since there is no estimation from LPG consumption in pilot flames of flares and this emission source is very small.

3.6. Regulatory Requirements

Regulatory requirements relating to LFG projects are evaluated annually by investigating municipal, state and national regulations pertaining to LFG. This is done through consultation with the appropriate regulatory bodies, ongoing discussion with regulators, and monitoring of publications delineating upcoming legislative changes governing landfills and LFG.

4. Data records and storage

Data collected from each of the parameter sensors is transmitted directly to an electronic database from which the carbon credits volume calculations may be carried out, as described in section 2.1 above. A hard copy backup or reports of the data may be printed as required or recorded in Portable Document Format (PDF). Backup of the electronic data is conducted on 2-3 minute intervals, as described above.

4.1. Data Assessment and Reporting

Assessment of the flow and composition data described above coupled with the operating hours of flares and flares destruction efficiencies are used to determine the quantity of carbon credits to be generated.

The destruction efficiency of the flare is a function of the internal combustion temperature and resident holding time, which are generally measured by the flare system controller and recorded for auditing purposes. Extensive technical documentation is available that documents the destructive efficiency of the enclosed drum flares that are used, subject to the flow rate and combustion temperature verification. Destruction efficiency will also be assessed periodically through measurement of uncombusted methane emissions.

As discussed in Section 2.1, flow data is normalized to standard temperature, pressure, and composition for reporting purposes. The data is compiled and assessed to produce the required quantification and validation. The periodic monitoring report will contain the data required for the verification of the carbon credits, and additionally may contain operational data from the collection system and flaring system described below to illustrate that the system is well maintained and operating at peak efficiency. Records of regular maintenance performed will also be a component of the annual report.

5. Related monitoring and project performance review

EcoUrbis will conduct an additional operational monitoring of the LFG collection system to check the project performance and ensure that the system is being operated both correctly and efficiently. Periodic adjustments to the horizontal trenches and to the extraction wells/drains are required to optimize the capture and collection systems effectiveness. LFG collection field adjustments are made based upon a review of the trench and well performance history considered within the context of the overall LFG collection field operation in order to maximize the collection of methane balanced against minimization of any oxygen in the system that could introduce unsafe operating conditions. Monitoring at each trench and extraction well will consist of the following parameters: valve position, individual well/trench flow, individual well/trench vacuum, and composition of the gas collected, i.e., methane, carbon dioxide, and oxygen, using a portable measuring device.

6. Emergency procedures

As a precautionary measure, the Landtec® system is plugged to a battery-based uninterruptible power supply (UPS) to avoid data loss due to power failures. As a backup is produced and stored off-site from the main recording system, no more than 2 to 3 minutes of data at a time would ever be lost due to a system malfunction.

All data is collected through a Landtec® Field Analytical Unit (FAU) and is transmitted to a Landtec® Field Server Unit (FSU), which records the data on-site and automatically sends it via a “always-on” Internet connection to an off-site server for storage and off-site back-up. All collected data is available for viewing, report generation, and retrieval through a Web interface, the EnvironComp™ Reporting System (ECRS), which can be accessed from anywhere an Internet connection is available. The plant Manager will check daily the records. In addition, there is an Emergency Plan including other types of emergencies such as fire and work accidents.

7. Calibration

All the measurement instruments are subjected to regular calibration as per manufacturer’s specifications. The regular check and calibration are made by the operators. The plant Manager is responsible for checking the equipment’s proper working order, as well as checking and storing up the calibration certificates and records. Calibration certificates are kept for all the equipment during the crediting period and two years after.

8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

The date of completion the application of the methodology to the project activity study is 05/06/2025.

The person/entity determining the baseline is as follows:

Beng Engenharia Ltda, São Paulo, Brazil

Contact person: Mr. João Sprovieri

Mr. Francisco Santo

Email: joao.sprovieri@beng.eng.br

francisco.santo@beng.eng.br

Beng Engenharia Ltda is not a Project Participant.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

>>

29/02/2012⁵¹

C.1.2 Expected operational lifetime of project

>>

25y and 0 months⁵².

C.2. Crediting period of project

C.2.1 Start date of crediting period

>>

During the project transition from CDM to GS4GG, few deviations were approved in respect to the Crediting Periods:

- Deviation 668, approved on 27/04/2024: Granted permission for the Project Developer to proceed for the issuance request for the monitoring period starting from 20/01/2021
- Deviation 669, approved on 28/05/2024: Granted permission to proceed exempting the application of the new rule DESIGN CERTIFICATION RENEWAL REQUIREMENTS- CDM PROJECTS TRANSITIONING TO GS4GG and follow the

⁵¹The starting date of the project activity is the purchase of the main equipment

⁵² In accordance with manufacturer's specifications and technical literature. Evidences made available to DOE. Thus, the project activity is expected to operate until 29/02/2037, comprehending the whole crediting period.

previous valid rule GS “GHG EMISSIONSREDUCTION & SEQUESTRATION PRODUCT REQUIREMENTS”

- Deviation 160, approved on 31/07/2025: Granted permission to extent the deadline for completing the CP Renewal VVB opinion submission for six more months, changing the deadline from March 31st, 2025 to September 30th, 2025. The new deadline was met successfully.

CDM Crediting Period⁵³:

1st CP: From 01/04/2013 until 31/03/2020 (7 years)

2nd CP: From 01/04/2020 until 31/03/2027 (7 years)

3rd CP: From 01/04/2027 until 31/03/2034 (7 years)

GS4GG Crediting Period⁵⁴:

1st CP: From 01/04/2013 until 31/03/2020 (7 years)⁵⁵

2nd CP: From 01/04/2020 until 31/03/2025 (5 years)

3rd CP: From 01/04/2025 until 31/03/2028 (3 years)

C.2.2 Total length of crediting period

>>

3 years and 0 months (The total length will not be more than 15 years).

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in [Appendix 1](#), ongoing monitoring is summarised below.

⁵³ Source: https://cdm.unfccc.int/Projects/DB/LRQA_Ltd1332768548.38/view?cp=1

⁵⁴ The total crediting period cannot exceed 15 years

⁵⁵ Project was transitioned from CDM to GS4GG under the 2nd CDM Crediting period

PRINCIPLES	MITIGATION MEASURES ADDED TO THE MONITORING PLAN
Safeguarding Principle 6.1	This Principle will be monitored
Safeguarding Principle 3	This Principle will be monitored

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The company structure has few employees. However, it is possible to verify the existence of women in management positions and the non-existence of wage discrimination between men and women. It is also important to note that this system includes guidelines for internal and external company communication to ensure that all actors directly or indirectly involved in its operations are well informed about the project. In this sense, it is important to highlight the relevance of the public meeting held in the past about the implementation of the project, which was widely advertised in the community, had an effective participation of the invited actors, and counted with a significant presence of women, as reported in the Stakeholder Consultation Report.
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	Brazil is a signatory to the identified commitment, which can be verified at the following electronic address: https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=IV-8&chapter=4&clang=en Additionally, as mentioned in the previous answer, a woman is responsible for the execution of the project, which can be seen in the organization chart of the company.

Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	No. The project is an LFG collection and utilization project and it does not discriminate among gender nor reduce access to or control of resources for women. The Project beneficiaries in terms of employment and social ascension of the area are common for both gender and it does not involve any kind of discrimination in any form.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	A Stakeholder’s consultation was held in 2022/2023 by following the applicable requirements for Gold Standard Project. Since the project complies with the requirements of “Principle 2 – Gender Equality and Women’s Rights” and also achieves SDG 5, no Expert would be required to assist with Gender issues at the Stakeholder Consultation.

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round. All attendees of Stakeholder Consultation were invited for Stakeholder Feedback Round.

E.1 Summary of stakeholder mitigation measures

>>

Presented in a separate document. Gold Standard Stakeholder Consultation Report.

E.2 Final continuous input / grievance mechanism

METHOD	INCLUDE ALL DETAILS OF CHOSEN METHOD (S) SO THAT THEY MAY BE UNDERSTOOD AND, WHERE RELEVANT, USED BY READERS.
--------	---

Continuous Input / Grievance Expression Process Book (mandatory)	A record book will be made available at the plant entrance to register comments, suggestions or complaints. The location does not requires requesting direct access to the company to accesses the book.
GS Contact (mandatory)	help@goldstandard.org
Telephone access (optional)	+55 (11) 4083-8260 May be more convenient to a stakeholder.
Internet/email access (optional)	visitas@ecourbis.com.br www.ecourbis.com.br The website of the company and an e-mail address were informed for stakeholder convenience.
Nominated Independent Mediator (optional)	-
Other	-

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into [SECTION D](#) above. Please refer to the instructions in the [Guide to Completing](#) this Form.

SOCIAL SAFEGUARDING PRINCIPLES		
Reference requirement	Question	Response
P.1 Human Rights		
P.1.1.1 	Does the project developer, its representatives and the Project disrespect internationally proclaimed human rights?	☐ YES ☐ NO (x)
P.1.1.1 	Is the project involved or complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights?	☐ YES ☐ NO (x)
P.1.1.2 	Have local communities or individuals raised human rights concerns regarding the project (e.g., during the stakeholder engagement process, grievance processes, public statements)?	☐ YES ☐ NO (x)
P.1.1.3 	Is there a risk that rights-holders (e.g., Project-affected stakeholders) do not have the capacity to claim their rights?	☐ YES ☐ NO (x)
P.1.1.3 	Does this project undermine national or regional measures for the realisation of the right to development?	☐ YES ☐ NO (x)
If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements. Please add text here...		
Would the project potentially involve or lead to:		
P.1.1.1 	adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalised groups?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.1.1.2 	inequitable or discriminatory impacts on affected populations, particularly people living in poverty or marginalised or excluded individuals or groups, including persons with disabilities?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.1.1.3 	restrictions in availability, quality of and/or access to resources or basic services, in particular to marginalised individuals or groups, including persons with disabilities?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.1.1.3 	exacerbation of conflicts among and/or the risk of violence to project-affected communities and individuals?	☐ YES ☐ POTENTIALLY

		☐ NO (x)
--	--	---------------------------------

Briefly describe below how the project incorporates a human rights-based approach.
For example, by describing how the project design:

- is informed by human rights analysis, including from UN human rights mechanisms (human rights treaty bodies, universal periodic review, special procedures)
- includes measures to assist the government to realise (respect, protect and fulfil) human rights under international law and to implement human rights-related standards in national law (whichever is higher)
- enhances the availability, accessibility and quality of benefits and services for potentially marginalised individuals and groups, and to increase their inclusion in decision-making processes that may impact them (consistent with the non-discrimination and equality human rights principle)
- provides reasonable accommodations to strengthen inclusivity and accessibility of project benefits and services to persons with disabilities.

The project activity through its management will achieve requirements by being compliance with all laws and regulations in the host country.

The project burns LFG in flare and/or exports it to consumers using a dedicated pipeline, avoiding the consumption of natural gas. Therefore, it provides development opportunity to all section of people proving renewable energy and better livelihood. Hence, the project positively recognizes human rights to sustainable development.

Brazil adopted 'American Convention on Human Rights' 1992 and the project is bound to follow the rules and regulation of host country. Hence, the project does not violate human rights obligations adopted by the host country.

The Brazilian Constitution states in its article 5 that all persons are equal before the law, without any distinction whatsoever, Brazilians and foreigners residing in the country being ensured of inviolability of the right to life, to liberty, to equality, to security and to property.

Therefore, the project upholds the principles of accountability and the rule of law, participation and inclusion, and equality and non-discrimination.

Brazil adopted 'American Convention on Human Rights' 1992 and the project is bound to follow the rules and regulation of host country. Hence, the project does not violate human rights obligations adopted by the host country.

Brazil has ratified 'International Convention on the Elimination of All Forms of Racial Discrimination :1969, the project will not discriminate with regards to its participation and inclusion.

P.2 | GENDER EQUALITY AND WOMEN'S EMPOWERMENT

P.2.1.1 	Have women's groups/leaders raised gender equality concerns regarding the project, (e.g., during the stakeholder engagement process, grievance processes, public statements)?	☐ YES ☐ NO (x)
P.2.1.2 	Does the project undermine the principles of non-discrimination, equal treatment, and equal pay for equal work?	☐ YES ☐ NO (x)
P.2.1.2 	Does the project prevent men and women from having equal opportunities to participate in identified tasks and activities, whether through paid work, volunteer work, or community contributions, as appropriate?	☐ YES ☐ NO (x)
P.2.1.2 	Does the project limit the participation of women or men based on pregnancy, maternity/paternity leave, or marital status?	☐ YES ☐ NO (x)
P.2.1.2 	Is information about project objectives being communicated in a way that is inappropriate for the local context and not tailored to the methods of understanding of both women and men, which could hinder their participation?	☐ YES ☐ NO (x)
P.2.1.3 	Has the project assessed gender risks without referencing the country's gender strategy or equivalent national commitment?	☐ YES ☐ NO (x)
P.2.1.4 	Has expert stakeholder(s) been involved, and has their input been requested for the project design on gender equality and women's empowerment?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.2.1.1 	adverse impacts on gender equality and/or the situation of women and girls?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.2.1.1 	exacerbation of risks of gender-based violence? For example, through the influx of workers to a community, changes in community and household power dynamics, increased exposure to unsafe public places and/or transport, etc.	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.2.1.2 	reproducing discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	☐ YES ☐ POTENTIALLY ☐ NO (x)

P.2.1.2	limitations on women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well-being.	☐ YES ☐ POTENTIALLY ☒ NO (x)
---------	--	--

Briefly describe below how the project is addressing any identified risk to gender equality and women's empowerment.

The project activity through its management will achieve requirements by being compliance with all laws and regulations in the host country.

The Citizens' Constitution declared women equal to men in all legal respects, explicitly stating in Article 5 of Title II that "men and women have equal rights and duties under the terms of this Constitution." The National Council on Women's Rights, formed in 1975, advocated successfully on behalf of including gender conscious legislation in the new constitution of 1988.

As explained above the project does not contribute to discrimination against women or reinforce gender-based discrimination and/or inequalities.

The project respects the key gender issues and requirements of gender-sensitive design and implementation of the project (SDG#5). Brazil is a country where gender inequality is strong due to socio-cultural heritage. It is very common to see situations where men have better income than women when exercising the same employment position. The project contributes to achieve a gender equality and income equivalence between men and women by adopting the better labour practices for their employees.

P.3 | COMMUNITY HEALTH AND SAFETY

P.3.1.1	Does the project involve potential risks to the health and safety of affected communities during its life cycle?	☐ YES ☐ NO (x)
P.3.1.2	Does the project involve any potential risks to the workers' safety and health?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.3.1.1	construction and/or infrastructure development (e.g., roads, buildings, dams)?	☐ YES
---------	--	------------------------------

		☐ NO (x)
P.3.1.2 	air pollution, noise, vibration, traffic, injuries, physical hazards, poor surface water quality due to runoff, erosion, sanitation?	☐ YES (x) ☐ POTENTIALLY ☐ NO
P.3.1.2 	harm or losses due to failure of structural elements of the project (e.g., collapse of buildings or infrastructure)?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.3.1.2 	risks of water-borne or other vector-borne diseases (e.g., temporary breeding habitats), communicable and noncommunicable diseases, nutritional disorders, mental health?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.3.1.2 	transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g., explosives, fuel and other chemicals during construction and operation)?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.3.1.2 	adverse impacts on ecosystems and ecosystem services relevant to communities' health (e.g., food, surface water purification, natural buffers from flooding)?	☐ YES ☐ POTENTIALLY ☐ NO (x)

Briefly describe below how the project is addressing any identified risk related to community health and safety.

The project uses urban solid waste as resource to generate LFG and supply LFG to consumers through dedicated pipeline.

The project counts with valid operational licence issued by the Local Environmental Agency.

Therefore, project does not affect any marginalized or vulnerable communities.

The project activity through its risk-management by monitoring Environmental Permits.

P.4 | CULTURAL HERITAGE, INDIGENOUS PEOPLE, DISPLACEMENT AND RESETTLEMENT

P.4.1 | Sites of Cultural and Historical Heritage

P.4.1.1 	Does the project involve altering, damaging, or removing sites, objects, or structures of significant cultural heritage?	☐ YES ☐ NO (x)
---------------------------	--	---

If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.4.1.1 	activities adjacent to or within a cultural heritage site?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.1.1 	significant excavations, demolitions, movement of earth, flooding or other environmental changes?	☐ YES

		☐ POTENTIALLY ☐ NO (x)
P.4.1.1 	alterations to landscapes and natural features with cultural significance?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.1.1 	adverse impacts to sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, practices)? (Note: projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.1.2 	utilisation of tangible and/or intangible forms (e.g., practices, traditional knowledge) of Cultural Heritage for commercial or other purposes?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.1.2 	If answer to question above is "YES" or "POTENTIALLY" - are the communities made aware of their right under the law, scope and nature of proposed development and its potential consequences?	☐ YES ☐ NO ☐ NA (x)
P.4.1.3 	If answer to question above is "YES" - does the project provide equitable sharing of benefits from commercialisation of such knowledge, innovation, or practice, consistent with their customs and traditions?	☐ YES ☐ NO ☐ NA (x)
P.4.1.4 	If answer to question above is "YES" - are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)
P.4.1.4 	If answer to question above is "YES", has project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.4.2 |Forced Eviction and Displacement](#)

P.4.2.1 	Does the project involve any risks related to involuntary relocation of people?	☐ YES ☐ NO (x)
---------------------------	---	---

If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.4.2.1 	risk of forced evictions or involuntary relocation of people?	☐ YES ☐ POTENTIALLY ☐ NO (x)
---------------------------	---	---

P.4.2.2 	temporary or permanent and full or partial physical displacement (including people without legally recognisable claims to land)?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.2.2 	economic displacement (e.g., loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.2.2 	If answer to question above is “YES” or “POTENTIALLY”, - has the project developed Resettlement Action Plan or Livelihood Action Plan in consultation and agreement with affected individual, group or community? - has the project integrated Resettlement Action Plan or Livelihood Action Plan into the Project design?	☐ YES ☐ NO ☐ NA (x)
P.4.2.3 	If answer to question above is “YES” - are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)
P.4.2.3 	If answer to question above is “YES”, have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.4.3 | LAND TENURE AND OTHER RIGHTS](#)

P.4.3.1 	Does the project involve any risks related to identifying and managing legitimate tenure rights that may be affected by the project?	☐ YES ☐ NO (x)
---------------------------	--	---

If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.4.3.1 	impacts on or changes to land tenure arrangements and/or community-based property rights/customary rights to land, territories and/or resources?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.3.1 	uncertainties with regards to land tenure, access rights, usage rights or land ownership? Examples include, but are not limited to water access rights, community-based property rights and customary rights.	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.3.2 	Changes in legal arrangements, if yes, are the changes done in line with relevant laws and regulations?	☐ YES ☐ NO ☐ NA (x)

P.4.3.2 	Changes in legal arrangements, if yes, are these changes agree with free, prior and informed consent of the involved stakeholders?	☐ YES ☐ NO ☐ NA (x)
P.4.3.3 	Does some other entity (other than the project developer) hold uncontested land title for the entire Project Boundary?	☐ YES ☐ NO ☐ NA (x)
P.4.3.4 	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)
P.4.3.4 	If answer to question above is "YES", have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☐ NA (x)
P.4.3.5 	Have project developer in consultation with stakeholders established a functioning mechanism to receive, process, resolve, communicate and record grievances?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.4.4 | INDIGENOUS PEOPLES](#)

P.4.4.1 	Does the project involve Indigenous People within the Project area of influence who may be affected directly or indirectly by the Project?	☐ YES ☐ NO (x)
---------------------------	--	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project potentially involve or lead to:

P.4.4.1 	affect areas where indigenous peoples are present (including project area of influence)	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.4.1 	affect areas, land and territory claimed by indigenous peoples?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.4.1 	impacts (positive or negative) to the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.4.7 	If answer to above questions is "YES" or "POTENTIALLY", - Is it determined that the proposed project may affect the rights, lands, resources, or territories of indigenous people? - Has an "Indigenous People Plan" (IPP) or "Indigenous People Plan Framework" been	☐ YES ☐ NO ☐ NA (x)

	elaborated and included in the project documentation? - Was the plan developed in accordance with the effective and meaningful participation of indigenous peoples and in accordance with UNDP Guidelines?	
P.4.4.3 	risk of forcibly removing indigenous people from their lands and territories?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.4.4 	utilisation and/or commercial development of natural resources on lands and territories claimed by indigenous peoples? Consider, and where appropriate ensure, consistency with the answers under Principle 4.1 above	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.4.4.5 P.4.4.6 	If answer to question above is "YES" or "POTENTIALLY" - Did the project obtain free, prior and informed consent from indigenous people before taking their cultural, intellectual, religious, and/or spiritual property? - Does the project ensure that the indigenous people receive an equitable sharing of benefits resulting from the use of their traditional knowledge and practices? - Does the project ensure that the sharing of benefits resulting from the use of indigenous peoples' traditional knowledge and practices is culturally appropriate and inclusive? - Does the project ensure that the provision of equitable sharing of benefits does not impede land rights or equal access to basic services including health services, clean water, energy, education, safe and decent working conditions, and housing?	☐ YES ☐ NO ☐ NA (x)
P.4.4.8 	Does the project lack appropriate feedback and grievance channels for Indigenous Peoples and their representatives?	☐ YES ☐ NO ☐ NA (x)
P.4.4.8 	Has a grievance mechanism not been established at the beginning of programme or project implementation with due consideration given to customary dispute settlement mechanisms among the Indigenous Peoples concerned and will it remain operational throughout the project cycle?	☐ YES ☐ NO ☐ NA (x)
P.4.4.9 	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)

P.4.4.9 	If answer to question above is "YES", have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☐ NA (x)
---------------------------	--	--

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.5 | CORRUPTION](#)

P.5.1.1 	Does the project involve, or is it complicit in, contributing to or reinforcing corruption or corrupt projects?	☐ YES ☐ NO (x)
P.5.1.1 	Does the project have a risk of encouraging bribery, kickbacks, or other unethical behavior?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

ECONOMIC SAFEGUARDING PRINCIPLES

[P.6 | ECONOMIC IMPACTS](#)

[P.6.1 | LABOUR RIGHTS AND WORKING CONDITIONS](#)

P.6.1.1 	Does the project involve, facilitate, or condone forced labor, or pose a potential risk of forced labor?	☐ YES ☐ NO (x)
P.6.1.1 	Does the project violate any labor or health and safety laws, international obligations, or ILO conventions?	☐ YES ☐ NO (x)
P.6.1.2 	Does the project violate the principles of equal opportunity and fair treatment in its employment decisions?	☐ YES ☐ NO (x)
P.6.1.3 	Does the project violate national laws, if available regarding non-discrimination in employment?	☐ YES ☐ NO (x)
P.6.1.4 P.6.1.5 	Does the project allow child labor?	☐ YES ☐ NO (x)
P.6.1.7 P.6.1.8 	Does the project have insufficient processes and measures in place to ensure the safety and health of project workers?	☐ YES ☐ NO (x)
P.6.1.9 	Does the project have insufficient measures to safeguard and support vulnerable project workers, such as women, people with disabilities, migrant workers, and young workers, and to prevent any kind of harassment, abuse, bullying, or exploitation, including gender-based violence (GBV)?	☐ YES ☐ NO (x)
P.6.1.10 	Does the project have no grievance mechanism available for workers to voice workplace concerns? Is information about this mechanism not provided to workers at the time of recruitment, or is it not easily accessible?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here...

Would the project potentially involve or lead to:

(NOTE: APPLIES TO BOTH PROJECT AND CONTRACTOR WORKERS)

P.6.1.1 	use of forced labour?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.1 	working conditions that do not meet national labour laws and international commitments?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.1 	working conditions that may deny freedom of association and collective bargaining?	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.6.1.1 	absence of documented working agreements with all individual workers <i>if such agreements do not exist, or do not address working conditions and terms of employment, the project developer shall provide reasonable working conditions and terms of employment.</i>	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.6.1.1 	use of migrant workers? <i>if engaged, the developer shall ensure that they are engaged substantially equivalent terms and conditions to non-migrant workers carrying out similar work.</i>	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.6.1.1 	having no arrangements for basic services ⁵⁶ for workers? <i>the project developer shall put in place and implement policies on the quality and management of the accommodation and provision of basic services in a manner consistent with the principles of non-discrimination and equal opportunity. Workers' accommodation arrangements should not restrict workers' freedom of movement or of association</i>	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.2 	any form of discrimination or harassment based on factors unrelated to job requirements, such as gender, race, nationality, ethnicity, social or indigenous origin, religion or belief, disability, age, or sexual orientation?	☐ YES ☐ POTENTIALLY ☐ NO (x)

⁵⁶ Basic services requirements refer to minimum space, supply of water, adequate sewage and garbage disposal system, appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting, and in some cases basic medical services.

P.6.1.2 	any form of discrimination in any aspect of employment, such as recruitment, compensation, working conditions, training, job assignment, promotion, termination, or discipline?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.2 	harassment, intimidation, and/or exploitation, especially in regard to women?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.3 	discriminatory working conditions and/or lack of equal opportunity where national law provides provision to address non-discrimination in employment?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.6.1.4 	use of child labour? (including third-party engaged workers)	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.6.1.4 	inadequate and verifiable mechanisms for age verification?	☐ YES ☐ NO (X)
P.6.1.7 	no processes and measures in place for the safety and health of project workers?	☐ YES ☐ NO (X)
P.6.1.7 	No provision of safety and health training provisions, including on the proper use and maintenance of personal protective equipment conducted by competent persons and the maintenance of training records?	☐ YES ☐ NO (X)
P.6.1.7 	No provision to record and document accidents, diseases, incidents, and any resulting injuries, illnesses, or deaths?	☐ YES ☐ NO (X)
P.6.1.8 	occupational health and safety risks due to physical, chemical, biological and psychosocial hazards (including violence and harassment) throughout the project life-cycle?	☐ YES ☐ NO (X)
P.6.1.9 	No measures to protect vulnerable project workers from harassment, exploitation, and gender-based violence (GBV)? This includes women, people with disabilities, migrant workers, and young workers.	☐ YES ☐ NO (X)
P.6.1.10 	No grievance mechanism available for workers to voice workplace concerns.	☐ YES ☐ NO (X)
P.6.1.11 	No measures for due diligence and the establishment of policies and procedures to manage and monitor the performance of third-party employees in the project?	☐ YES ☐ NO (X)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here...

[P.6.2 | NEGATIVE ECONOMIC CONSEQUENCES](#)

P.6.2.1 	Is there a risk of project failure during implementation or after project certification due to a lack of financial resources?	☐ YES ☐ NO (X)
---------------------------	---	---

P.6.2.2 	Does the project have potential negative impacts or pose a risk to the local economy?	☐ YES ☐ NO (X)
P.6.2.2 	Are there any potential risks or negative impacts this project may have on vulnerable or marginalised social groups, despite the benefits it may bring?	☐ YES ☐ NO (X)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here...

Would the project involve or lead to:

P.6.2.2 	economic impacts (negative/detrimental) to the local economy?	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.6.2.2 	negative economic consequences during and after project implementation, e.g., for vulnerable and marginalised social groups in targeted communities?	☐ YES ☐ POTENTIALLY ☐ NO (X)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.7 | CLIMATE AND ENERGY](#)

[P.7.1 | GHG EMISSIONS](#)

P.7.1.1 	Does the project have a risk of increasing greenhouse gas emissions over the Baseline Scenario?	☐ YES ☐ NO (X)
---------------------------	---	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.7.1.1 	increase greenhouse gas emissions over the Baseline Scenario?	☐ YES ☐ POTENTIALLY ☐ NO (X)
---------------------------	---	---

If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.7.2 | ENERGY SUPPLY](#)

P.7.2.1 	Does the project pose a risk to the availability and reliability of energy supply to other users?	☐ YES ☐ NO (x)
---------------------------	---	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.7.2.1 	negative impact on the availability and reliability of energy supply to other users?	☐ YES ☐ POTENTIALLY ☐ NO (x)
---------------------------	--	---

If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.8 | WATER](#)

[P.8.1 | IMPACT ON NATURAL WATER PATTERNS/FLOWS](#)

P.8.1.1 	Does the project increase water usage to a level that will not allow for the maintenance of environmental flows?	☐ YES ☐ NO (x)
P.8.1.1 	Does the project result in the discharge of wastewater that does not meet the required standard for beneficial reuse and could therefore negatively impact the environmental flow?	☐ YES ☐ NO (x)
P.8.1.1 	Does the project have the potential risk to exceed the rate of recharge for the groundwater source?	☐ YES ☐ NO (x)
P.8.1.1 	Does the project involve any processes or activities that could contaminate the groundwater and render it unsuitable for use?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.8.1.1 	affect the natural or pre-existing pattern of watercourses, groundwater and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.8.1.1 	Wastewater discharge of quality that does not meet the required standard for beneficial reuse?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.8.1.1 	significant extraction, diversion of ground water? For example, construction of dams, reservoirs, river basin developments, groundwater extraction	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.8.1.2 	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

P.8.2 | EROSION AND/OR WATER BODY INSTABILITY

P.8.2.1	Does the project have a risk of negatively impacting the catchment and has it been assessed and addressed?	☐ YES ☐ NO (x)
---------	--	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.8.2.2	negatively impact on the catchment area?	
-		
P.8.2.5	<i>If yes, Erosion prevention measures, including soil and slope protection measures, must be implemented before project commencement. These measures should involve natural terracing, infiltration strips, permanent ground cover, hedge and tree rows, and effective slope length assessment. Regular reassessment of these measures is necessary.</i>	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.8.2.6	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

P.9 | ENVIRONMENT, ECOLOGY AND LAND USE

P.9.1 | LANDSCAPE MODIFICATION AND SOIL

P.9.1.1	Is there any risk of soil resource degradation or loss of ecosystem services provided by soils in the project?	
-		
P.9.1.3	<i>If yes, the project shall maintain healthy soils by minimising negative impacts on soil health, productivity, structure, and water retention. Steps to minimise soil degradation include crop rotation, composting, using N-fixing plants, and reducing tillage and ecologically harmful substances.</i>	☐ YES ☐ NO (x)

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.1.4 	production, harvesting, and/or management of living natural resources by small-scale landholders and/or local communities?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.1.4 	if answer to above question "yes" or "potentially", does project adopt appropriate and culturally sensitive sustainable resource management practices?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.2 | VULNERABILITY TO NATURAL DISASTER](#)

P.9.2.1 	Does the project have any risks associated with natural or man-made hazards that could result from land use changes due to the project?	☐ YES ☐ NO (x)
---------------------------	---	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.2.2 	any potential risks that require emergency preparedness and response planning?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.2.2 	if answer to above question "yes" or "potentially", did the project developer disclose appropriate information about emergency preparedness and response to affected communities?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.3 | BIOSAFETY AND GENETIC RESOURCES](#)

P.9.3.1 	Does the project involve the transfer, handling, and use of genetically modified organisms/living modified organisms that may result in adverse effects on biological diversity?	☐ YES ☐ NO (x)
---------------------------	--	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.3.1 	the transfer, handling and use of genetically modified organisms/living modified organisms (GMOs/LMOs) that result from modern biotechnology	☐ YES ☐ POTENTIALLY ☐ NO (X)
P.9.3.1 	If answer to above question is "yes" has a risk assessment by a competent Expert stakeholder been carried out in accordance with Annex iii of the Cartagena protocol on biosafety to the convention on biological diversity?	☐ YES ☐ NO ☐ NA (x)

P.9.3.2 	If answer to above question is "yes" has any risks identified in the risk assessment?	☐ YES ☐ NO ☐ NA (x)
P.9.3.3 	Forestry (for example Afforestation/Reforestation) involving GMO planting? <i>Note - Forestry projects (for example Afforestation/Reforestation) involving GMO planting are not eligible for Certification under Gold Standard for the Global Goals.</i>	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.4 | RELEASE OF POLLUTANTS](#)

P.9.4.1 	Does the project have a risk of releasing pollutants to air, water, and land in routine, non-routine, or accidental circumstances?	☐ YES ☐ NO (x)
---------------------------	--	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.4.1 	any potential risk of pollutant release that cannot be avoided?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.4.3 	If answer to above question is "Yes" or "potentially", has the project identified all potential pollution sources that may degrade the quality of soil, air, surface, and groundwater in the project area?	☐ YES ☐ NO ☐ NA (x)
P.9.4.2 	If answer to above question is "Yes" or "potentially", do the pollution prevention and control technologies and practices applied during the project life cycle align with national regulations or international best practices?	☐ YES ☐ NO ☐ NA (x)
P.9.4.3 	If answer to above question is "Yes", is there a monitoring plan to ensure that mitigation measures are implemented, and resources are protected?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.5 | HAZARDOUS AND NON-HAZARDOUS WASTE](#)

P.9.5.1 	Does the project involve the generation of waste materials (both hazardous and non-hazardous)?	☐ YES ☐ NO (x)
P.9.5.3 	Does the project involve risk of release of hazardous materials resulting from their production, transportation, handling, storage, or use?	☐ YES ☐ NO (x)

P.9.5.5 	Does the project involve the use of any chemicals or materials subject to international bans or phase-outs?	☐ YES ☐ NO (x)
---------------------------	---	---

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.5.1 	the generation and management of waste materials?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.5.1 	treatment, destruction, or disposal of waste material?	☐ YES ☐ NO ☐ NA (x)
P.9.5.1 	If answer to above question is "Yes", does the project involve an environmentally friendly method that includes appropriate control of emissions and residues resulting from the handling and processing of waste material?	☐ YES ☐ NO ☐ NA (x)
P.9.5.3 	risk of release of hazardous materials resulting from their production, transportation, handling, storage, or use?	☐ YES ☐ NO ☐ NA (x)
P.9.5.3 	If answer to above question is "yes", does project has measures in place to address health risks?	☐ YES ☐ NO ☐ NA (x)
P.9.5.4 	Involve manufacture, trade, and use of chemicals and hazardous materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer	☐ YES ☐ POTENTIALLY ☐ NO (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.6 | PESTICIDES & FERTILISERS](#)

P.9.6.1 	Does the project involve the use of chemical pesticides?	☐ YES ☐ NO (x)
P.9.6.5 	Does the project involve purchase, store, manufacture, trade or use products that fall in Classes IA (extremely hazardous) and IB (highly hazardous)	☐ YES ☐ NO (x)
P.9.6.6 	Does the project use fertilisers, and if so, are measures being taken to minimise their use and nutrient losses to the environment?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.6.1 	chemical pesticides use for pest management?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.6.4 	If answer to question above is "yes" or "potentially", does project has documented Chemical Pesticides Policy in place?	☐ YES ☐ NO ☐ NA (x)
P.9.6.5 	purchase, store, use, manufacture, or trade in Class II (moderately hazardous) pesticides?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.6.5 	If answer to question above is "yes" or "potentially", does project has appropriate controls on manufacture, procurement, or distribution and/or use of these chemicals?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.7 | HARVESTING OF FORESTS](#)

P.9.7.1 	Does the project have a risk of unsustainable forest management, including timber harvesting?	☐ YES ☐ NO (x)
P.9.7.1 	Does the project pose a risk of depleting biodiversity and ecosystem functionality in areas where improved forest management is undertaken?	☐ YES ☐ NO (x)
P.9.7.1 	Does the project risk not meeting requirements for environment-friendly, socially beneficial, and economically viable plantations using native species whenever possible?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

[P.9.8 | FOOD SECURITY](#)

P.9.8.1 	Does the project involve the risk of negatively influencing access to and availability of food for people affected?	☐ YES ☐ NO (x)
---------------------------	---	---

If the answer to the question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.8.1 	modification of the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	☐ YES ☐ POTENTIALLY ☐ NO (x)
---------------------------	--	---

If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

P.9.9 | ANIMAL WELFARE

P.9.9.1 	Does the project involve any risks to animal welfare? Animal welfare shall be ensured by providing access to water and food, appropriate environment, humane treatment, and staff training. Evidence of mistreatment will be treated as an immediate non-conformity.	☐ YES ☐ NO (x)
P.9.9.2 	Does the project involve any potential risk of excessive or inadequate use of veterinary medicines?	☐ YES ☐ NO (x)
P.9.9.4 	Does the project involve the risk of administering synthetic growth promoters, including hormones?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here...

Would the project involve or lead to:

P.9.9.1 	animal husbandry or harvesting of fish populations or other aquatic species? ⁵⁷	☐ YES ☐ NO ☐ NA (x)
P.9.9.1 	limiting access for animals to basic needs like drinking water, adequate food, daylight, appropriate shelter etc.?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.9.3 	inadequate measures to isolate sick animals and control the spread of disease, especially zoonotic diseases?	☐ YES ☐ NO ☐ NA (x)
P.9.9.5 	inadequate low-stress methods, equipment, and facilities that facilitate calm animal movement.	☐ YES ☐ NO ☐ NA (x)
P.9.9.6 	inadequate measures to ensure that animals are exposed to the least stress possible during transportation and slaughtering?	☐ YES ☐ NO ☐ NA (x)
P.9.9.7 	inappropriate spacing per animal and stocking rates per land unit?	☐ YES ☐ NO ☐ NA (x)
P.9.9.8 	inadequate measures to address the specific needs of aquatic animals?	☐ YES ☐ NO ☐ NA (x)

⁵⁷ 'Involve' means if the project mechanism and/or impact(s) are achieved via changing animal husbandry practices in some way.

P.9.9.9 P.9.9.10 	primary production of living natural resources such as animal husbandry, aquaculture, and fisheries? If the answer is yes, implement industry-standard sustainable management practices in line with to one or more relevant and credible standards and utilise available technologies.	☐ YES ☐ NO ☐ NA (x)
---	--	--

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.10 | HIGH CONSERVATION VALUE AREAS AND CRITICAL HABITATS](#)

P.9.10.1 	Does the project have the risk of negatively impacting HCV areas and/or critical habitats?	☐ YES ☐ NO (x)
P.9.10.2 	Does the project in the project area or area of downstream impacts have risks to the following: native tree patches, individual native trees, freshwater resources (including rivers, lakes, swamps, temporary water bodies, and wells), habitats of rare, threatened, and endangered species, and biodiversity-enhancing areas?	☐ YES ☐ NO (x)

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.10.1 	identified habitats as HCV areas and or Critical habitats?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.10.1 	If answer to above question is "yes", does the project have any risks that could negatively impact the catchment, project success, and surrounding HCV and ecological assets, as well as any measurable adverse impacts on the criteria or biodiversity values for which the critical habitat was designated, and on the ecological processes supporting that biodiversity?	☐ YES ☐ NO ☐ NA (x)
P.9.10.1 	If answer to above question is "yes", is a robust, appropriately designed, and long-term Habitats and Biodiversity Action Plan absent which will make the project unable to achieve net gains of those biodiversity values for which the critical habitat was designated?	☐ YES ☐ NO ☐ N/A (x)
P.9.10.2 	Does the project area or area of downstream impacts have native tree patches, individual native trees, freshwater resources (including rivers, lakes, swamps, temporary water bodies, and wells), habitats of rare, threatened, and endangered species, and biodiversity-enhancing areas?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.10.2 	If the answer to the above question is "yes", will the project have any adverse effects on these areas?	☐ YES ☐ No ☐ NA (x)
P.9.10.3 	If the answer to above question is "yes", does the project has opportunities to minimise unwarranted conversion or	☐ YES

	degradation of the habitat and to enhance the habitat as part of its development?	☐ No ☐ NA (x)
P.9.10.4 	Is the project applying Land Use & Forest Activity Requirements and managing a minimum 10% of the project area to protect or enhance the biological diversity of native ecosystems following HCV approach as per the given requirements?	☐ YES ☐ No ☐ NA (x)
P.9.10.5 	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.11 | ENDANGERED SPECIES](#)

P.9.11.1 	Does the project lead to the reduction or negative impact on any recognised Endangered, Vulnerable or Critically Endangered species?	☐ YES ☐ NO (x)
----------------------------	--	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.11.2 	distortion of habitats of endangered species?	☐ YES ☐ POTENTIALLY ☐ NA (x)
P.9.11.2 	If answer to the above question is "yes", does the project plan to protect and enhance them?	☐ YES ☐ POTENTIALLY ☐ NO ☐ N/A (x)
P.9.11.2 	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☐ NA (x)

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

[P.9.12 | INVASIVE ALIEN SPECIES](#)

P.9.12.1 	Does project introduce any alien species (not currently established in the country or region of the project) into new environments?	☐ YES ☐ NO (x)
----------------------------	---	---

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here....

Would the project involve or lead to:

P.9.12.1	risk of introducing any alien species with a high risk of invasive behaviour regardless of whether such introductions are permitted under the existing regulatory framework?	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.12.1	risk of potential accidental or unintended introductions including the transportation of substrates and vectors (such as soil, ballast, and plant materials) that may harbour alien species.	☐ YES ☐ POTENTIALLY ☐ NO (x)
P.9.12.2	risk of spreading alien species into areas in which they have not already been established?	☐ YES ☐ POTENTIALLY ☐ NO (x)

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here....

APPENDIX 2 - CONTACT INFORMATION OF PROJECT DEVELOPER(S)

Organization name	EcoUrbis Ambiental S/A
Registration number with relevant authority	07.037.123/0003-08
Street/P.O. Box	Rua João Francisco Delmas, 117 - Campo Limpo
Building	-
City	São Paulo
State/Region	SP
Postcode	-
Country	Brazil
Telephone	+55 (11) 5512-3204
E-mail	curien@ecourbis.com.br
Website	http://www.ecourbis.com.br/
Contact person	Cesar Urien
Title	Director
Salutation	Mr.
Last name	Urien
Middle name	-
First name	Cesar
Department	Finance Director
Mobile	-
Direct tel.	-
Personal e-mail	-

APPENDIX 3 - LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	N/A
Risk of change to the Project activities during Project Certification Period:	N/A
Land-use history and current status of Project Area:	N/A
Socio-Economic history:	N/A
Forest management applied (past and future)	N/A
Forest characteristics (including main tree species planted)	N/A
Main social impacts (risks and benefits)	N/A
Main environmental impacts (risks and benefits)	N/A
Financial structure	N/A
Infrastructure (roads/houses etc):	N/A
Water bodies:	N/A
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	N/A
Where indigenous people and local communities are situated:	N/A
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	N/A

APPENDIX 4 - DESIGN CHANGES

A4.1. Details of proposed or actual design change

>>

Regarding the 2nd Crediting Period, all changes were addressed using Gold Standard Design Change Requirements

Correction

A typo mistake was identified under Section B.7. table Data / Parameter TDLy (value amended from 23.6% to 26.3%) and a Correction of a design change is suitable to be submitted under the issuance track, according to INDICATIVE LIST OF DESIGN CHANGES THAT CAN BE SUBMITTED WITH ISSUANCE TRACK under section 8 of the GS4GG Design Change Requirements v1.1, since it correlates to:

a) Any corrections to project information of a certified project activity that do not affect the design of the project activity. Such corrections may include typographical errors, location, names and numbers of components, etc.

The ex-ante ERs calculation was not impacted by the typo mistake since it addresses the correct TDLy value.

Change to the Project Design

Removal of a component or technology/measure specified in the design certified PDD. There was no implementation of the power generation plant, instead of there was only a supplying LFG to consumers through a dedicated pipeline, as follows:

- LFG supply to consumer 1 (SJEA): Since 28/04/2014
- LFG supply to consumer 2 (FSL/ZEG⁵⁸): Since 01/03/2019
- LFG supply to consumer 3 (METAGAS): Since 12/04/2024

This change impacts in the additionality of the project activity. Thus, it was identified three realistic and credible alternative scenarios to the project activity:

- Scenario 1: LFG1 + E3;
-

⁵⁸Currently owned by GASWATT due to contract transferring

- Scenario 2: LFG1 + E3 + (c);
- Scenario 4: LFG2 + E3

Despite the TOOL32 (Positive List) is applicable in this project resulting in automatic additionality for this project as discussed in Sub-step3a, to reinforce the vulnerability of the project, the financial analysis has also been demonstrated for all scenarios.

The list the key parameters changed in the financial analysis is:

- Updated project Revenues from LFG Sales from 2019 until 2036 using real historical data from 2019 to 2023 and an estimate data for 2024 on.
- Updated project O&M from LFG Station from 2019 until 2036 using real historical data from 2019 to 2023 and an estimate data for 2024 on.
- Updated project CAPEX from 2019 until 2036 using real historical data from 2019 to 2023 and an estimate data for 2024 on.
- Removed project O&M from Electricity Generation from the entire cashflow
- Removed project Capex from Electricity Generation from the entire cashflow

Also, there was a change in the amount of waste disposal during the period between 2020 and 2037. The update was applicable since the landfill concession was renewed on June 13th 2024.

Update and/or permanent changes to design certified monitoring plan:

There was an exclusion of the monitoring parameter $ECBL_{k,y} = EGP_{J,y}$ which is the "Net amount of electricity generated using LFG in year y (MWh/yr)" due to the exclusion of the power generation plant from the project activity.

A4.2. Describe the impacts of design change on the following

a. Additionality

>>

This change impacts in the additionality of the project activity. Thus, it was identified three realistic and credible alternative scenarios to the project activity.

Despite the TOOL32 (Positive List) is applicable in this project resulting in automatic additionality for this project as discussed in Sub-step3a, to reinforce the vulnerability of the project, the financial analysis has also been demonstrated for all scenarios, demonstrating that project additionality is maintained.

b. Applicability of methodology and other methodological regulatory documents with which the project activity has been certified

>>

Not applicable since there was no additional component in the project activity.

c. Compliance with the monitoring plan of the applied methodology

>>

There was an exclusion of the monitoring parameter $ECBL_{k,y} = EGPJ_y$ which is the "Net amount of electricity generated using LFG in year y (MWh/yr)" due to the exclusion of the power generation plant from the project activity.

d. Level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan

>>

Not applicable since there was an exclusion of the monitoring parameter $ECBL_{k,y} = EGPJ_y$ and no level of accuracy and completeness have been changed.

e. Scale of the project activity

>>

Not applicable since the proposed changes maintain the project as Large-Scale

f. Stakeholder consultation

>>

Since there was no additional component in the project activity, the stakeholder consultation is not needed for the approval of changes

g. Sustainable development criteria

>>

There was an exclusion of monthly electric energy delivered from Indicator 7.2, remaining only LFG supplying to consumers through dedicated pipeline.

h. Safeguarding assessment

>>

Since there was no additional component in the project activity, the safeguarding assessment remains valid.

i. Compliance with applicable legislation

>>

Updated Sub-step 1b. from Section B.4 indicating that: "The regulation applicable for supplying LFG to consumers is Resolution ANP n° 886/2022 ."

j. Only for LUF Projects: Transparent summary of all approved changes in Project Area, Eligible Area and accompanying changes in ex-ante emissions removals.

Not applicable.

DOCUMENT HISTORY

Version	Date	Remarks
1.5	29 June 2023	Editorial changes to match V2.1 of the Safeguarding Principles Requirements
1.4	21 June 2023	Editorial changes to match V2.0 of the Safeguarding Principles Requirements
1.3	14 April 2023	Integrated the design change memo as annex of the document. Editorial changes
1.2	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1.0	10 July 2017	Initial adoption