



Doña Juana Landfill Gas to Energy Project

Monitoring Report No. 10



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Contents

1	CCMP general information	4
1.1	CCMP description	4
1.2	CCMP holder information	6
1.3	Information from other CCMP institutional stakeholders	6
1.4	Status of CCMP implementation	6
1.5	Spatial and temporary limits of the CCMP	7
1.5.1	Spatial limits	7
1.5.2	Time limits	7
2	Deviations of CCMP implementation from the PDD	8
3	Methodological deviations	9
4	GHG emission sources	10
5	Quantification of net GHG emissions and net GHG emission reductions	11
5.1	Leakage	24
5.2	Re-evaluation of the baseline scenario	24
5.3	Natural disturbances and other catastrophic events	24
6	Stakeholder consultation	25
7	Uncertainty	26
8	Contributions to the United Nations Sustainable Development Goals	27
9	Legal and documentary issues	28
9.1	Legal requirements	28
9.2	Link with NDCs	31
10	Grouped project	31
11	Data and parameters	32
12	Information management	43
13	Annexure (Safeguarding Principles and Procedures)	44
14	References	48
15	Document history (Monitoring Report)	49
16	Template history	50

Acronyms and abbreviations

CCMP	Climate Change Mitigation Programme or Project
GHG	Greenhouse Gases
PDD	Project Description Document
SDGs	Sustainable Development Goals
VVB	Validation and Verification Body
RCP	Renewal of Crediting Period

1 CCMP general information

1.1 CCMP description

The project involves landfill gas capture and use in reciprocating engines for electricity generation, and the flaring of any excess landfill gas at the Doña Juana Landfill site, which is located at District Capital of Bogota- Colombia.

Before the implementation of the project activity, the landfill gas from the landfill used to be vented to the atmosphere through passive wells. The combustion of the landfill gas avoids emissions which would otherwise occur from the anaerobic degradation of the waste in Doña Juana Landfill site. The project is also exporting electricity to the Colombian National Grid, hence also avoiding emissions from electricity which would be generated from fossil fuel power plants connected to this same grid. The useful life of the project could be until after 2050 due to possible adaptations inside the landfill.

The disposal of waste in Doña Juana has been carried out in various modules that are contained in the polygon licensed for this purpose, the various areas of old operation and the recent ones such as: Zone VIII, Zone VII, Biosolids and Optimization Zone included on going Phases I, II.

- **Duration or lifetime of the CCMP (in years):** 32 years, 22/09/2009 to 03/11/2041
- **The accreditation period of the CCMP:** 22/09/2023 to 21/09/2033
- **Current Monitoring Period:** 01.02.2024 to 31.12.2024

Baseline scenario: As per Registered PDD, prior to the implementation of the project, GHG emissions were released into the atmosphere through passive extraction systems without any type of treatment or adaptation, or control of emissions. In addition, electricity was generated by the set of plants connected to the national grid with partial use of fossil fuels. The baseline scenario continues to be valid.

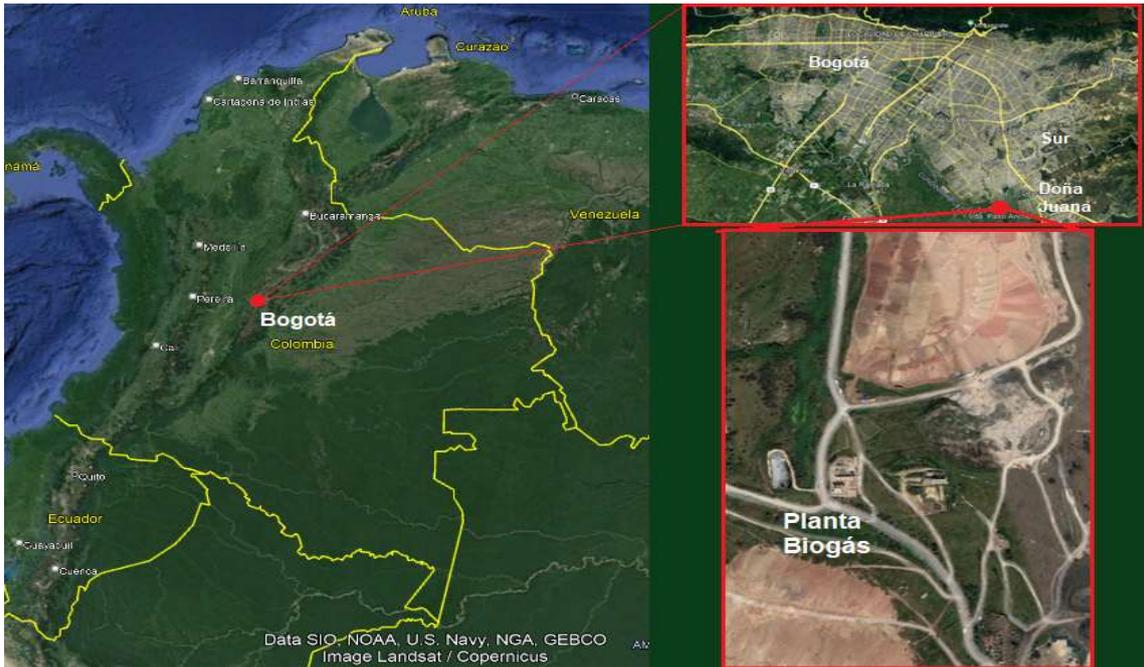
Project scenario: The project scenario:

- Biogas capture and is destroyed in a controlled manner by combustion (flares);
- Biogas capture and is used to generate electricity (engines).

Location of the project:

The Project is in the Doña Juana landfill site, located in the town of Ciudad Bolivar, in the city of Bogotá, Capital District, at km 5 of Boyacá Avenue via el Llano. The G.P.S. (Global Positioning System) coordinates for the boundaries of the landfill are indicated below:

Limits	U.T.M.	
North West	4º 31' 31.33" N	74º 07' 48.48" W
North East	4º 31' 29.52" N	74º 07' 34.71" W
South West	4º 29' 27.39" N	74º 08' 56.02" W
South East	4º 29' 23.99" N	74º 07' 40.97" W



Sectorial scope and type of CCMP

Sectorial scope:

- Number 13: Waste Management and Disposal.
- Number 1: Energy industries (renewable sources)

Large Scale Project

Destruction of emissions / Renewable Energy

1.2 CCMP holder information

Full name(s)	Helmuth Mauricio Gallego Sanchez
Name of institution (if applicable)	BIOGÁS COLOMBIA S.A.S. E.S.P.
Roles or responsibilities	Owner
Identification	900.181.508-1
Location	Doña Juana Landfill site Bogotá- Colombia
Telephone number(s)	+57 6015522520
E-mail address	n.pineros@biogas.com.co

1.3 Information from other CCMP institutional stakeholders

Name of institution (if applicable)	
Roles or responsibilities	
Identification	
Location	
Telephone number(s)	
E-mail address	

1.4 Status of CCMP implementation

During the Current Mentoring Period:

- The biogas capture and subsequent utilization for electricity generation continued in normal state. The destruction of methane is carried out through combustion in flare or in reciprocating engines for generating electrical energy, the generated energy is consumed in facilities of the project and delivered to the national electrical grid.
- 100% of the Captured gas is used in reciprocating engines or burned in a monitored flare.
- All equipment meets maintenance and calibration requirements.
- The planning of the projects to expand the installed power generation capacity remains as it was proposed in the PDD.
- During current monitoring period (01.02.2024 to 31.12.2024), GE1 engine had a long downtime due to maintenance activities. Engines GE3 and GE4 were commissioned in early August 2024. These new engines start its continuous operation at the end September 2024, increasing the amount GHG emissions from electric power generation.

- The methane destruction emissions in GE3 and GE4 engines start in November 17th 2024, date when the instrumentation was installed on the gas supply lines of this equipment.
- There has been no overhaul times or exchange of equipment's in the project activity.
- There has been no change in technical parameters of the project as provided in registered CERCARBONO PDD.
- During the current monitoring period there no events and/or situations have occurred that may impact the applicability of the applied methodology.

GHG emission reductions achieved in this monitoring period

Monitoring period	Baseline scenario	Project scenario		Net reduction
	GHG emissions	GHG emissions	Leakage	
01.02.2024 to 31.12.2024	648,052	40	0	648,012
Total	648,052	40	0	648,012

Summary of Previous Verification Events: This is the tenth verification event for the project, second verification post RCP.

1.5 Spatial and temporary limits of the CCMP

1.5.1 Spatial limits

According to the section 1.4.2.1 Spatial limits of PDD, there have been no changes in the areas, facilities or processes that make up the PMCC.

1.5.2 Time limits

The PMCC monitoring time limit begins on 01.02.2024 to 31.12.2024.

2 Deviations of CCMP implementation from the PDD

According to the PDD v4.3 in section 3.1 *Quantification of GHG emissions in the baseline scenario* for the emissions calculation in project scenario, and described in the constant parameters of section 9.2 *Monitoring of GHG emissions in the baseline scenario*, the GWP_{CH_4} value of Sixth Assessment Report AR6 of IPCC_AR6_Table 7.15 was set to be used.

However, during the current monitoring period, aligned with the Cercarbono's document *Guidance on the Use of Global Warming Potential (GWP) Values v2.0* published on 19/03/2025, for GWP_{CH_4} value of **28** is used.

There were NO other deviations in the processes, machinery or technologies at the PMCC, with respect to what was established in the PDD v4.3.

3 Methodological deviations

During the monitoring period, NO methodological deviations occurred.

4 GHG emission sources

The emission sources to be considered in the baseline and project scenarios are described below.

Activity	Baseline scenario			Project scenario			Leakage		
	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
Landfill methane generation sanitary	No	Yes	No	No	No	No	No	No	No
Destruction by combustion of methane from landfill biogas in a flare	No	No	No	No	Yes	No	No	No	No
Electricity generation on the grid with fossil fuels	Yes	No	No	No	No	No	No	No	No
Electrical consumption of systems control and auxiliaries.	No	No	No	Yes	No	No	No	No	No

5 Quantification of net GHG emissions and net GHG emission reductions

The details of period and methodology applied are provided below

Monitoring period	Methodology Applied
01.02.2024 to 31.12.2024	M/MLF-DE_RE01: Methodology for Projects for the Destruction and Utilization of Biogas from Landfill Sites, Ver 2.1 ¹ .

Quantification of GHG emissions in the baseline scenario

As per Paar 6.2 of M/MLF-DE_RE01 (version 2.1), emissions in baseline scenario are estimated as per below equation

$$BLE_t = LBBLE_t + PGBLE_t + TEBLE_t + NPBLE_t + BTBLE_t$$

Where,

Variable	Units	Description
BLE_t	tCO_2e	Baseline GHG emissions during period t of baseline scenario.
$LBBLE_t$	tCO_2e	GHG emissions from landfill-produced biogas in the baseline scenario in period t , expected to be captured for its destruction or use.
$PGBLE_t$	tCO_2e	GHG emissions from fossil fuel-based electric power generation in the baseline scenario in period t , expected to be displaced by the project.
$TEBLE_t$	tCO_2e	GHG emissions from fossil fuel-based thermal energy generation in the baseline scenario in period t , expected to be displaced by the project.
$NPBLE_t$	tCO_2e	GHG emissions from natural gas consumption in the baseline scenario in period t , expected to be displaced due to the use of biogas through injection into natural gas pipelines by the project.
$BTBLE_t$	tCO_2e	GHG emissions from fossil fuel consumption in the baseline scenario in period t , expected to be displaced due to the use of biogas through injection into dedicated biogas pipelines or through bio-gas distribution using tank trucks by the project.

¹ <https://www.cercarbono.com/wp-content/uploads/Landfill-Methodology-V-2.1.pdf>

In the project scenario, Variable (**TEBLE_t**, **NPBLE_t** and **BTBLE_t**) are set to **ZERO** because before the project and during the project in the Doña Juana landfill due to:

- There is no thermal energy generation with fossil fuels,
- There is no consumption of natural gas, and
- There is no fossil fuel consumption in the use of biogas through injection into dedicated biogas pipelines or through biogas distribution using tank trucks by the project.

Hence, for the project the equation will be as follows:

$$BLE_t = LBBLE_t + PGBLE_t$$

Landfill-generated biogas captured for its destruction or use (**LBBLE_t**)

As per Paar 6.2.1 of M/MLF-DE_RE01 (version 2.1), Biogas generation at landfill is calculated using below equation

$$LBBLE_t = ((MLGP_t \times (1 - OX_t)) - MFUBL_t) \times GWP_{CH_4}$$

Wherein,

Variable	Units	Description
LBBLE_t	tCO ₂ e	GHG emissions from landfill-produced biogas in the baseline scenario in period t, expected to be captured for its destruction or use.
MLGP_t	tCH ₄	Methane in landfill-produced biogas in project scenario, flared or used by the CCMP in period t.
OX_t	NA	Oxidated methane fraction in period t.
MFUBL_t	tCH ₄	Methane in landfill-produced biogas, flared or used in baseline scenario in period t. This value is applicable if methane destruction was carried out prior to project development. Otherwise MPLBt = 0. For determination of mass flow from volume flow data, the use of CDM's Methodological Tool 08 is recommended.
GWP_{CH₄}	tCO ₂ e/tCH ₄	Methane Global Warming Potential.

In the project scenario,

- Oxidation Value (**OX_t**) is considered as 0.1, Since as per IPCC (2019), the use of the oxidation value of 0.1 will be justified for well-managed landfills. In the case of the project, the oxidation factor of 0.1 will be used as recommended by the IPCC and in a conservative manner, taking into account that the Doña Juana landfill is considered an Administered or managed landfill.

- Value of ($MFUBL_t$) is considered as **ZERO**, since before the execution of the project as there is no combustion or use of methane.
- Value of (GWP_{CH_4}) will be considered as 28 (As per Cercarbono's document *Guidance on the Use of Global Warming Potential (GWP) Values v2.0* published on 19/03/2025)

Furthermore, the $MLGP_t$ value corresponds to the amount of methane contained in the captured biogas for purposes of being employed in the project scenario, either to be destroyed or totally/partially used. To obtain such value two scenarios may be present, first is $MLGP_t$ estimation after the project development (ex-post scenario), and second is $MLGP_t$ determination before project development (ex-ante scenario).

a. In the ex-post scenario, it is calculated by means of following equation:

$$MLGP_t = MDFP_t + MPGP_t + MTEP_t + MGNP_t + MIDP_t$$

Wherein,

Variable	Units	Description
$MLGP_t$	tCH_4	Methane in landfill-produced biogas in project scenario, flared or used by the CCMP in period t .
$MDFP_t$	tCH_4	Methane in biogas destroyed by flaring in the project in period
$MPGP_t$	tCH_4	Methane in biogas used for electric power generation in period
$MTEP_t$	tCH_4	Methane in biogas used for thermal energy generation in period
$MGNP_t$	tCH_4	Methane in biogas used for injection in natural gas systems in the project in period
$MIDP_t$	tCH_4	Methane in biogas injected in biofuel-dedicated systems or distributed by means of tank trucks in period

In the project scenario, Variable ($MTEP_t$, $MGNP_t$ and $MIDP_t$) are set to **ZERO** because there is no biogas used for thermal energy generation, or injected in natural gas systems or injected in biofuel-dedicated systems or distributed by means of tank trucks. Hence the equation will be for the project as follows:

$$MLGP_t = MDFP_t + MPGP_t$$

In the project scenario,

- $MDFP_t$ shall be measured by project managers in volumetric terms
- $MPGP_t$ shall be estimated by using CDM's Methodological Tool 08 (Tool to determine the mass flow of a greenhouse gas in a gaseous stream)

b. In the ex-ante scenario, it is calculated by means of following equation:

$$MLGP_t = MLGB_t + \eta SC$$

Wherein,

Variable	Units	Description
$MLGP_t$	tCH_4	Methane in landfill-produced biogas in project scenario, flared or used by the CCMP in period t .
$MLGB_t$	tCH_4	Methane in biogas expected to be generated in the landfill in baseline scenario in period t .
η_{SC}	NA	Biogas capture system efficiency (or that of the system to be installed in the landfill).

Furthermore, $MLGB_t$ is calculated using below equation which is based in the method described by IPCC (2019).

$$MLGP_t = DCBL_t \times MVF \times 16/12$$

Wherein,

Variable	Units	Description
$MLGP_t$	tCH_4	Methane in biogas expected to be generated in the landfill in baseline scenario in period t .
$DCBL_t$	tC	Degradable organic carbon available in degraded solid waste in baseline scenario in period t .
MVF	NA	Methane volume fraction in landfill gas.
$16/12$	NA	Molecular mass ratio CH_4/C .

In the project scenario, A default value of 0.5 for methane content in landfill (MVF) will be considered. This is as per IPCC (2019)

Furthermore, $DCBL_t$ is calculated with Equation 6 (IPCC, 2019).

$$DCBL_t = BCBL_{t-1} \times (1 - e^{-k})$$

Wherein,

Variable	Units	Description
$DCBL_t$	tC	Degradable organic carbon available in degraded solid waste in baseline scenario in period t .
$BCBL_{t-1}$	tC	Biodegradable organic carbon mass accumulated in solid waste in the baseline scenario at the end of $t-1$ period.
k	year	Reaction constant for $t-1$ period.

$$k = \frac{\ln(2)}{LML}$$

Variable	Units	Description
k	<i>year</i>	Reaction constant for t-1 period.
LML	<i>year</i>	Landfill mean lifetime.

Furthermore, **BCBL_t** is calculated as per below equation

$$\mathbf{BCBL}_t = \mathbf{TCBL}_t + (\mathbf{BCBL}_{t-1} \times e^{-k})$$

Furthermore, the total mass of biodegradable organic carbon available in solid waste sent to the landfill (**TCBL_t**) is calculated using below equation (IPCC, 2019).

$$\mathbf{TCBL}_t = \mathbf{WBL}_t \times \mathbf{DOCF}_t \times \mathbf{DOCF}_{r,t} \times \mathbf{MCF}$$

Wherein,

Variable	Units	Description
TCBL_t	<i>tC</i>	Total mass of biodegradable organic carbon available in solidwaste expected to be received in the landfill in baseline scenario at the end of period t .
WBL_t	<i>t</i>	Amount of waste expected to be received in the landfill in the baseline scenario in period t .
DOCF_t	<i>tC/t waste</i>	Degradable organic carbon fraction in waste expected to be sent to the landfill in period t .
DOCF_{r,t}	<i>NA</i>	Degradable organic carbon fraction decomposed in anaerobic conditions in period t .
MCF	<i>NA</i>	Methane correction factor for anaerobic degradation in year it is deposited.

In the project scenario,

- A default value of 1.0 for **MCF** will be considered. This is as per IPCC (2019)
- **DOCF_t** is calculated using below equation

$$\mathbf{DOCF}_t = \sum_{r=1}^R (\mathbf{DOCF}_{r,t} \times \mathbf{F}_{r,t})$$

Wherein,

Variable	Units	Description
DOCF_t	<i>tC/t waste</i>	Degradable organic carbon fraction in waste expected to be sent to the landfill in period t .

$DOCF_{r,t}$	$tC/t\ waste$	Degradable organic carbon fraction decomposing in anaerobic conditions for r waste types in period t of baseline scenario.
$F_{r,t}$	NA	Proportion of r waste type as compared to the total r waste in period
r	NA	Waste type index.
R	NA	Total count of considered waste types.

In the project scenario, A default value of 0.5 for $DOCF_{r,t}$ will be considered. This is as per IPCC (2019)

For values included in all above equation, as well as for those employed in its calculation (coefficients, factors or heating values used in methodology), the IPCC Good Practice Guidance shall be used, conservatively considering the uncertainty for such values (IPCC, 2019).

GHG emissions from fossil fuel-based electric power generation in the baseline scenario (PGBLE_t)

As per Paar 6.2.2 of M/MLF-DE_RE01 (version 2.1), Baseline scenario for fossil fuel-based electric power generation depends on if such fuels are used (or not) in an interconnected grid.

In the project case, electric power generation depends on in an interconnected grid, hence As per Paar 6.2.3 of M/MLF-DE_RE01 (version 2.1), **Electric power generation in an interconnected grid**

Projects baseline scenario shall be related to GHG emissions that would have been generated for an equivalent electricity block to that produced by the project, supplied by the interconnected grid with its associated emissions.

$$PGBLE_t = \sum_{j=1}^J ECBL_{j,t} \times EFIG_t \times (1 + TDTL_{j,t})$$

Wherein,

Variable	Units	Description
$PGBLE_t$	tCO_2e	GHG emissions from fossil fuel-based electric power generation in the baseline scenario in period t , expected to be displaced by the project.
$ECBL_{j,t}$	MWh	Electricity that would be consumed by user j in the baseline scenario in period t , expected to be displaced by the project.
$EFIG_t$	tCO_2e/MWh	CO ₂ emission factor of interconnected grid for period t .
$TDTL_{j,t}$	%	Average technical losses for electricity transmission and distribution to grid user j in period t .

<i>j</i>	NA	Index for electricity user to be supplied in project scenario.
<i>J</i>	NA	Total user count.

CO₂ emission factor of interconnected grid **EFIG_t** in the case of Colombia, is calculated by UPME as **0.586²** tCO_{2e}/MWh for 2023, and published in its Resolution 1198 of December 26th, 2024.

For the Average technical losses for electricity transmission and distribution to grid a **7.51%** value is used, which is calculated and published by the grid operator Enel Codensa in its annual report for 2024³.

Quantification of GHG emissions and reductions of GHG emissions in the project scenario

As per Paar 7.1 of M/MLF-DE_RE01 (version 2.1), GHG emissions to be considered in project scenario are described.

In the project scenario, there is no

- Fossil fuel consumption for ancillary processes (electric or thermal power generation)
- Methane emissions from distribution in pipeline networks or through tank-trucks.

Hence, **As per Paar 7.3 of M/MLF-DE_RE01 (version 2.1)**, Project scenario GHG emissions (PE_t) can be calculated using

$$PE_t = LMDPE_t + FFCPE_t + ECAPE_t + MLPPE_t + MLTPE_t$$

Variable	Units	Description
PE_t	tCO _{2e}	Project scenario GHG emissions during period t .
LMDPE_t	tCO _{2e}	GHG emissions from methane contained in landfill biogas destruction in flares in period t of project scenario.
FFCPE_t	tCO _{2e}	GHG emissions from fossil fuel use in ancillary processes (biogas treatment and purification systems, ancillary electricity generation, thermal equipment start-up, tank-truck distribution of methane contained in biogas, among others), in period t of project scenario.
ECAPE_t	tCO _{2e}	GHG emissions from electricity consumption in ancillary and control systems in period t in the project scenario, including biogas treatment and purification systems.
MLPPE_t	tCO _{2e}	GHG emissions from methane losses in pipeline distribution networks and systems in period t of project scenario.

² <https://www1.upme.gov.co/siame/Paginas/calculo-factor-de-emision-de-Co2-del-SIN.aspx>

³ https://www.enel.com.co/content/dam/enel-co/ingl%C3%A9s/shareholders_and_investors/enel-colombia/annual-reports/2024/memoria-anual-2024-diagramada.pdf

MLTPE_t	<i>tCO_{2e}</i>	GHG emissions from methane transport and losses in tank-truck distribution systems in period t of project scenario.
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In the project case,

$$PE_t = LMDPE_t + ECAPE_t$$

Project Emission from destruction of methane from landfill biogas in a flare (LMDPE_t)

As per Paar 7.3.1 of M/MLF-DE_RE01 (version 2.1), In cases where methane in landfill-captured biogas is flared, this part of project scenario GHG emissions shall be determined using following equation:

$$LMDPE_t = \sum_{m=1}^{MT} (MBFP_{m,t} \times (1 - \eta MDP_{j,t}) \times GWP_{CH_4})$$

Wherein,

Variable	Units	Description
LMDPE_t	<i>tCO_{2e}</i>	GHG emissions from methane contained in landfill biogas destruction in flares in period t of project scenario.
MBFP_{m,t}	<i>tCH₄</i>	Methane in biogas flared during minute m in period t in project scenario.
ηMDP_{j,t}	%	Flare methane destruction efficiency in minute m in period t in project scenario.
GWP_{CH₄}	<i>tCO_{2e}/tCH₄</i>	Methane Global Warming Potential.
m	NA	Index of the minute where flared methane is monitored.
MT	NA	Total minute count in period t .

Furthermore, as per Para 7.3.1 of M/MLF-DE_RE01 (version 2.1), **ηMDP_{j,t}** is defined by the CDM TOOL06: Project emissions from flaring, Version 04.0.

As per Para 17, TOOL06 (Ver 04.0.), To determine the efficiency of enclosed flares project participants shall choose to determine the efficiency based on monitored data or the option to apply a default value.

In the project scenario, flare efficiency based on monitored data would be used

As per Para 26, TOOL06 (Ver 04.0.), For the measurement of the flare efficiency, the project participants may choose one of the options below:

- Option B.1: The measurement is conducted by an accredited entity at least on a bi-annual basis;
- Option B.2: The flare efficiency is measured in each minute.

Furthermore, As per Para 29, TOOL06 (Ver 04.0.), The flare efficiency - $\eta_{flare,calc,m}$ - is determined based on monitoring the methane content in the exhaust gas, the residual gas, and the air used in the combustion process during the minute m in year y, as follows:

$$\eta_{flare,calc,m} = 1 - \frac{F_{CH_4,EG,m}}{F_{CH_4,RG,m}}$$

Where:

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

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

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

$F_{CH_4,RG,m}$ is calculated according to Step 1.

$F_{CH_4,EG,m}$ is determined according to Steps 2.1 - 2.4 below:

Step 2.1 of methodological tool (d) "Determine the methane mass flow in the exhaust gas on a dry basis":

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

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

Where:

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

$V_{EG,m}$ = Volumetric flow of the exhaust gas of the flare on a dry basis at reference conditions in minute m (m^3)

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

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

$$V_{EG,m} = Q_{EG,m} \times M_{RG,m}$$

Where:

$V_{EG,m}$ = Volumetric flow of the exhaust gas on a dry basis at reference conditions in minute m (m^3)

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

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

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

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

Where:

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

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

$V_{RG,m}$ = Volumetric flow of the residual gas on a dry basis at reference conditions in the minute m (m^3)

And

$$\rho_{RG,ref,m} = \frac{P_{ref}}{\frac{R_u}{MM_{RG,m}} \times T_{ref}}$$

Where:

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

P_{ref} = Atmospheric pressure at reference conditions (Pa)

R_u = Universal ideal gas constant ($Pa \cdot m^3/kmol \cdot K$)

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

T_{ref} = Temperature at reference conditions (K)

The equation below is used to calculate $MM_{RG,m}$. The project participants use simplification b) offered by tool (d), which is to measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N_2).

$$MM_{RG,m} = \sum_i (v_{i,RG,m} \times MM_i)$$

Where:

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

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

$v_{i,RG,m}$ = Volumetric fraction of component i in the residual gas on a dry basis at reference conditions in minute m

i = The components in the residual gas i = CH₄ and N₂

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

$Q_{EG,m}$ shall be determined as follows:

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

Where:

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

$Q_{CO_2,EG,m}$ = Quantity of CO₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

$Q_{N_2,EG,m}$ = Quantity of N₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

$Q_{O_2,EG,m}$ = Quantity of O₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

With

$$Q_{CO_2,EG,m} = n_{O_2,EG,m} \times V_{Mref}$$

Where:

$Q_{O_2,EG,m}$ = Quantity of O₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

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

V_{Mref} = Volume of one mole of any ideal gas at reference temperature and pressure (m³/kmol)

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

Where:

$Q_{N_2,EG,m}$ = Quantity of N₂ volume in the exhaust gas per kg of residual gas on a dry basis at reference conditions in the minute m (m³/kg residual gas)

V_{Mref} = Volume of one mole of any ideal gas at reference temperature and pressure (m³/kmol)

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

AM_N = Atomic mass of nitrogen (kg/kmol)

$v_{O_2,air}$ = Volumetric fraction of O₂ in air

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

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

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

Where:

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

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

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

AM_O = Atomic mass of oxygen (kg/kmol)

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

AM_H = Atomic mass of hydrogen (kg/kmol)

Determine the mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas, using the volumetric fraction of component i in the residual gas and applying the equation below. The project participants use simplification b) offered by tool (d), which is to measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N₂).

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

Where:

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

$v_{i,RG,m}$ = Volumetric fraction of component i in the residual gas on a dry basis at reference conditions in minute m

AM_i = Atomic mass of element i (kg/kmol)

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

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

j = Elements C, O, H and N

i = Components in the residual gas i = CH₄ and N₂

Furthermore, in the project scenario, from 2025 to 2041 with all the Methane in biogas expected to be captured, hence around the 85% of captured biogas will be used in gensets and no flared.

Project scenario GHG emissions due to imported electricity consumption ($ECAPE_t$)

As per Para 7.3.3 of M/MLF-DE_RE01 (version 2.1), In cases where imported electricity purchased from an external grid is used for methane contained in the biogas-capture, destruction or use systems, this fraction of the project scenario GHG emissions shall be determined as per in following equation

$$ECAPE_t = IECP_t \times EFGSP_t \times (1 + TDTP_t)$$

Where

Variable	Units	Description
$ECAPE_t$	tCO_2e	GHG emissions from electricity consumption in ancillary and control systems in period t in the project scenario, including biogas treatment and purification systems.
$IECP_t$	MWh	Imported electricity consumption in period t of project scenario.
$EFGSP_t$	tCO_2e/MWh	CO ₂ emission factor for the electric grid or electricity supplier in period t in project scenario.
$TDTP_t$	%	Average technical transmission and distribution losses for electricity supply from the electric grid or an electricity supplier in period t .

CO₂ emission factor of interconnected grid (**Margin operation**) EF_{GSP}_t in the case of Colombia, is calculated by XM as **0.723⁴** tCO₂e/MWh for 2023, and published in its platform Sinergox.

Net GHG emission reductions of the CCMP from 01.02.2024 to 31.12.2024.

Monitoring period	Baseline scenario	Project scenario		Net reduction
	GHG emissions	GHG emissions	Leakage	
01.02.2024 to 31.12.2024	648,052	40	0	648,012
Total	648,052	40	0	648,012

5.1 Leakage

As per Para 7.2 of M/MLF-DE_RE01 (version 2.1), Leakage is not considered in projects using methane contained in landfill biogas. Hence, no leakage is considered for the project.

5.2 Re-evaluation of the baseline scenario

There is NO change to the PMCC that has been made or that affects the baseline scenario proposed in the PDD.

5.3 Natural disturbances and other catastrophic events

During the monitoring period, there were NO natural disturbances (droughts, fires, floods, among others) or catastrophic events (wars, vandalism, burning by third parties, among others) that have affected the operation of the project.

⁴<https://sinergox.xm.com.co/oferta/Paginas/Historicos/Historicos.aspx?RootFolder=%2Foferta%2FHistoricos%2FEmisionesCO2%2FSoportesCalculoMDL&FolderCTID=0x012000B3FC86CB37661147B52CAE93637C1249&View=%7B946210C0%2D4071%2D4173%2D964C%2DE5BCCE4E66C%7D>

6 Stakeholder consultation

The PMCC has complied with what is established in the document resulting from the consultation of interested parties to date.

The project as previously established in the legal, environmental and technical criteria, Contract C137, Document issued by the environmental authority Declaration of no need for an environmental license and the certification of the Ministry of Interior OFI08-4442-DET-1000 of February 2008, concludes that the project that is transferred from the CDM, as can be evidenced in the documents registered with the UNFCCC, The project obtained registration which justifies the consultation of interested parties before the start of the project.

Biogás Colombia has the internal procedure PR-SIG-003- PQR and Corrective actions, which explains the procedure and treatment of communications and requests received. For the presentation of Petitions, Complaints, Claims or requests in general (PQR), the channel is available on the project website:

<https://www.biogas.com.co/index.php/contacto/>

or you can contact the email:

administracion@biogas.com.co

There have not been changes in areas, facilities, processes, legal or regulatory changes that modify what was agreed between the CCMP and the interested parties.

During the current monitoring period, no communications nor any Petitions, Complaints, Claims or requests in general (PQR) has been received via the established channels communications, about the PMCC activity. Furthermore, Biogás Colombia attends monthly social control technical tours that landfill operator carries out, actively participating and supporting to mitigate the impact of the landfill operation on the surrounding communities.

7 Uncertainty

In the GHG emissions reduction calculations, the aggregate uncertainty of the mitigation results is considered, mainly in the uncertainty present in the measurement instruments that could affect the results obtained.

This uncertainty is evaluated during the calibrations and the correct operating parameters are established, guaranteeing with the certificate that the instrument operates within the normal parameters and conditions, adequately quantifying the recording and measurement of the variables.

According to the Guidelines for the Expression of Measurement Uncertainty, the Parameters associated with the result of the measurement, which characterize the dispersion of the values that could reasonably be attributed to the measurand, are implicit in the measurement obtained during the measurement process. Calibration In calculations of reduction of GHG emissions, be aware of the aggregate uncertainty of mitigation results. Consider *ISO/IEC Guide 98-3* for assessing and expressing measurement uncertainty.

8 Contributions to the United Nations Sustainable Development Goals

During the present monitoring period (01.02.2024 to 31.12.2024), the project contribution to UN Sustainable Development Goals is provided below

SDG	SDG Target Indicator	PMCC contribution
7. Affordable and clean energy	7.2.1 Total electricity produced by unconventional renewable sources	During the present monitoring period, CCMP generated 6,081,013.56 kWh , this electricity is being supplied to the National Interconnected System (SIN) and the Landfill Operator.
7. Affordable and clean energy	7.2.3 Total and proportion of electricity produced by unconventional renewable sources consumed by PMCC activities.	During the present monitoring period, CCMP consumed the 98.02% of its operation requirement from non-conventional energy sources.
8. Decent work and economic growth	8.5.1 Total number of jobs created by PMCC.	During the present monitoring period, CCMP hired 4 new employees; Furthermore, 60% leadership positions are woman.
8. Decent work and economic growth	8.5.2 Proportion of local employees.	The CCMP has employed 9 people who are part of the community near the Doña Juana landfill site under indefinite-term contracts, this is 30% of total employees. During the present monitoring period, CCMP hired 2 new local employees .
13. Climate action	13.2.1 Amount of greenhouse gas emissions avoided or sequestered.	During the present monitoring period, PMCC has resulted in 648,012 tCO₂e of greenhouse gas emissions reduction

9 Legal and documentary issues

9.1 Legal requirements

The local, regional and national laws, statutes and regulatory frameworks that apply to the project activity and the main activity are as follows:

Norm or law	Type (legal, environmental, other)	Applicability/ Compliance (total or partial)	Justification
Law 142 of 1994, which establishes the regime for home public services and other provisions are issued.	Legal	Partial	Biogás Colombia SAS ESP is a public services company, and it complies the regulatory frame for its activity.
Resolution 1274 of 2006 by which the terms of reference for the preparation of the Environmental Impact Study for the construction and operation of Sanitary Landfills are accepted and other determinations are adopted	Environmental	Partial	This resolution establishes guidelines for the Environmental Impact Study and licenses for landfills in Colombia, it involves indirectly the operation of the CCMP.
Resolution 235 of 2007 from UAESP, by which the concession is awarded for the treatment and use of biogas from the Doña Juana landfill in the capital district applying the clean development mechanism	Legal	Total	The concession for the treatment and use of biogas from the Doña Juana landfill was assigned to Biogás Doña Juana proposer.
Declaration of no need for an environmental license for the activity of capture, treatment, thermal destruction and/or use of biogas issued by the Ministry of the Environment, Housing and Territorial Development.	Environmental	Total	Concept from the Environment national institution about the environmental requirements for the operation of the CCMP.

Filed MAVDT 4120-E1-75635 of July 2008.			
Contract C- 137 of 2007 between UAESP and Biogás Doña Juana SAS ESP by which the concession is awarded for the treatment and use of biogas from the Doña Juana landfill in the capital district applying the clean development mechanism	Legal	Total	Legal clauses for treatment and use of biogas from the Doña Juana landfill contract assigned to Biogás Doña Juana.
National approval letter – National Designated Authority – ministry of environment, housing and territorial development. June 2008.	Environmental	Total	The CCMP got the Environment national institution approval as CDM project.
Concession contract 344 of 2010 signed between the UAESP and the center of waste management CGR Doña Juana SA ESP.	Legal	Partial	Concession contract between the UAESP and actual landfill operator. Technical and legal guidelines about relation and coordination with Biogás Colombia.
Resolution 724 of 2010 by which the regulations for the granting of management are adopted and operation of the Doña Juana landfill.	Legal	Partial	Guidelines for management and operation of the landfill, including related with the biogas treatment and use operator.
Resolution 1351 of 2014 by means of which the single environmental license granted for the “Doña Juana sanitary landfill” project is modified and other determinations are made.	Legal Environmental	Partial	Regarding the actual environmental license for the Landfill site.
Decree 1784 of Nov 2017, which modifies and adds Decree 1077 of 2015 regarding the complementary activities of treatment and final	Legal	Partial	It established some guidelines for the biogas use and treatment projects feasibility.

disposal of solid waste in the public sanitation service.			
Resolution 0330 of 2017 by which the technical regulations for the drinking water and basic sanitation sector – RAS are adopted and resolutions 1096 of 2000, 0424 of 2001, 0668 of 2003, 1459 of 2005, 1447 of 2005 and 2320 are repealed. of 2009.	Legal Environmental	Partial	It established some technical guidelines for the biogas use and treatment projects in the sanitary and drinking water sectors.
Decree 926 of 2017, which establishes the Procedure for Non-Causation of National Carbon Tax.	Legal	Partial	It established the bases for the structuring of a national carbon market based on Carbon Tax for the fossil fuels users.
Resolution 1447 of August 2018, which regulates the monitoring, reporting and verification system of mitigation actions at the national level referred to in article 175 of law 1753 of 2015, and dictates other provisions.	Legal	Partial	Guidelines for information systems and registration of climate change mitigation initiatives. RENARE.
Law 1931 of July 27, 2018, which establishes guidelines for change management climate	Legal	Partial	National guidelines for management of climate change and public policies.
Resolution 831 of September 2020, by which resolution 1447 of 2018 is modified and other determinations are made	Legal	Partial	Modifications for the VBB accreditation requirements, and information systems and registration of climate change mitigation initiatives

9.2 Link with NDCs

In accordance with the sectoral strategic lines of GHG emission mitigation of the NDC of Colombia, measure number 5. Comprehensive Solid Waste Management. A specific compliance goal is proposed for the biogas that is going to be treated and used at the Doña Juana Sanitary Landfill. The target can be consult at:

<https://www.minambiente.gov.co/wp-content/uploads/2021/10/informe-actualizacion-contribucion-determinada-Colombia-ndc-2020.pdf>

10 Grouped project

The PMCC did NOT add new participants or operating units, and the PMCC has NOT been designed as grouped in the PDD.

11 Data and parameters

Responsible for PMCC monitoring: The company responsible for monitoring the project activity is Biogás Colombia SAS ESP. Below are the people responsible for monitoring the PMCC:

- Nicolas Piñeros A. – Operations Manager

Additionally, there are established procedures to verify the monitored data.

The monitoring parameters necessary for the PMCC are described in the PDD, in accordance with the methodology and methodological tools applied.

Constants used in the calculation of emissions reduction:

Parameter	Description	Value	Reference
Ox_t	Fraction of the oxidation factor in period t.	0.1	IPCC data. 2019. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 5 Waste. Chapter 3: Solid Waste Disposal. Table 3.2 Oxidation factor (OX) for SWDS
GWP_{CH_4}	Global warming potential of methane	28	Cercarbono's document <i>Guidance on the Use of Global Warming Potential (GWP) Values v2.0</i> published on 19/03/2025
η_{CS}	Biogas capture system efficiency	50%	M/MLF-DE_RE01 (versión 2.1)
$MFUBL_t$	Methane in landfill-produced biogas, flared or used in baseline scenario in period t.	0	Default Value, as per M/MLF-DE_RE01 (version 2.1)
$FCOD_t$	Fraction of	0.1	IPCC data. 2019.

	degradable organic carbon in the waste deposited in period t, in tons of C/ ton of waste	0.5 0.7	Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 5																																																																																		
MCF	Methane correction factor for aerobic decomposition in the year of deposition.	1.0	IPCC data. 2019. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 5 Waste. Chapter 3: Solid Waste Disposal. Table 3.1 (updated) SWDS classification and methane correction factors (MCF).																																																																																		
FCOD_{r,t}	Fraction of degradable organic carbon that decomposes under anaerobic conditions for the group or class of residue r, in period t	Wood and wood products: 43 Pulp, paper and cardboard (except sludge): 40 Food, food waste, beverages and tobacco (not sludge): 15 Textiles: 24 Pruning waste, gardens and parks: 20	IPCC data. 2019. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories																																																																																		
K	Decomposition rate for waste type r	<table border="1"> <caption>TABLE 3.3 RECOMMENDED DEFAULT METHANE GENERATION RATE (k) VALUES UNDER TIER 1 (Derived from k values obtained in experimental measurements, calculated by models, or used in greenhouse gas inventories and other studies)</caption> <thead> <tr> <th rowspan="4">Type of Waste</th> <th colspan="8">Climate Zone*</th> </tr> <tr> <th colspan="4">Boreal and Temperate (MAT ≤ 20°C)</th> <th colspan="4">Tropical[†] (MAT > 20°C)</th> </tr> <tr> <th colspan="2">Dry (MAP/PET < 1)</th> <th colspan="2">Wet (MAP/PET > 1)</th> <th colspan="2">Dry (MAP < 1000 mm)</th> <th colspan="2">Moist and Wet (MAP ≥ 1000 mm)</th> </tr> <tr> <th>Default</th> <th>Range[‡]</th> <th>Default</th> <th>Range[‡]</th> <th>Default</th> <th>Range[‡]</th> <th>Default</th> <th>Range[‡]</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Slowly degrading waste</td> <td>Paper/textiles waste</td> <td>0.04</td> <td>0.03[§] – 0.05^{§,¶}</td> <td>0.06</td> <td>0.05 – 0.07^{§,¶}</td> <td>0.045</td> <td>0.04 – 0.06</td> <td>0.07</td> <td>0.06 – 0.085</td> </tr> <tr> <td>Wood/ straw waste</td> <td>0.02</td> <td>0.01[¶] – 0.03[§]</td> <td>0.03</td> <td>0.02 – 0.04</td> <td>0.025</td> <td>0.02 – 0.04</td> <td>0.035</td> <td>0.03 – 0.05</td> </tr> <tr> <td>Moderately degrading waste</td> <td>Other (non – food) organic putrescible/ Garden and park waste</td> <td>0.05</td> <td>0.04 – 0.06</td> <td>0.1</td> <td>0.06 – 0.1[¶]</td> <td>0.065</td> <td>0.05 – 0.08</td> <td>0.17</td> <td>0.15 – 0.2</td> </tr> <tr> <td>Rapidly degrading waste</td> <td>Food waste/Sewage sludge</td> <td>0.06</td> <td>0.05 – 0.08</td> <td>0.185[¶]</td> <td>0.1[¶] – 0.2[¶]</td> <td>0.085</td> <td>0.07 – 0.1</td> <td>0.4</td> <td>0.17 – 0.7[¶]</td> </tr> <tr> <td>Bulk Waste</td> <td></td> <td>0.05</td> <td>0.04 – 0.06</td> <td>0.09</td> <td>0.08[¶] – 0.1</td> <td>0.065</td> <td>0.05 – 0.08</td> <td>0.17</td> <td>0.15[¶] – 0.2</td> </tr> </tbody> </table>	Type of Waste	Climate Zone*								Boreal and Temperate (MAT ≤ 20°C)				Tropical [†] (MAT > 20°C)				Dry (MAP/PET < 1)		Wet (MAP/PET > 1)		Dry (MAP < 1000 mm)		Moist and Wet (MAP ≥ 1000 mm)		Default	Range [‡]	Slowly degrading waste	Paper/textiles waste	0.04	0.03 [§] – 0.05 ^{§,¶}	0.06	0.05 – 0.07 ^{§,¶}	0.045	0.04 – 0.06	0.07	0.06 – 0.085	Wood/ straw waste	0.02	0.01 [¶] – 0.03 [§]	0.03	0.02 – 0.04	0.025	0.02 – 0.04	0.035	0.03 – 0.05	Moderately degrading waste	Other (non – food) organic putrescible/ Garden and park waste	0.05	0.04 – 0.06	0.1	0.06 – 0.1 [¶]	0.065	0.05 – 0.08	0.17	0.15 – 0.2	Rapidly degrading waste	Food waste/Sewage sludge	0.06	0.05 – 0.08	0.185 [¶]	0.1 [¶] – 0.2 [¶]	0.085	0.07 – 0.1	0.4	0.17 – 0.7 [¶]	Bulk Waste		0.05	0.04 – 0.06	0.09	0.08 [¶] – 0.1	0.065	0.05 – 0.08	0.17	0.15 [¶] – 0.2	Methodological tool (b) “Emissions from solid waste disposal sites” (version 08.0) based on IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)						
Type of Waste	Climate Zone*																																																																																				
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Fr,t	Average fraction of type r residue in year t (weight fraction)	MODEL	UAESP PGIRS			UAESP - Comprehensive Solid Waste Management Plan – PGIRS, according to the Decree National 1077 of 2015
		Food	51.31%			
		Garden	0.00%			
		Paper	13.67%			
		Wood	1.60%			
		Textile	4.54%			
		Nappies	0.00%			
		Plastics, other inert	28.88%			
WLB_t	Mass of waste deposited in the landfill, in period t.		Waste RSDJ ton	Ggr/year	Population	UAESP - Comprehensive Solid Waste Management Plan – PGIRS, according to the Decree National 1077 of 2015
		2023	2,407,469	2,407	7,968,095	
		2024	2,433,260	2,433	8,034,649	

Other constants used in equations according to Table 1 of TOOL 06:

Parameter	SI Unit	Description	Value
MM _{CH4}	kg/kmol	Molecular mass of methane	16.04
MM _{CO}	kg/kmol	Molecular mass of carbon monoxide	28.01
MM _{CO2}	kg/kmol	Molecular mass of carbon dioxide	44.01
MM _{O2}	kg/kmol	Molecular mass of oxygen	32.00
MM _{H2}	kg/kmol	Molecular mass of hydrogen	2.02
MM _{N2}	kg/kmol	Molecular mass of nitrogen	28.02
AM _C	kg/kmol (g/mol)	Atomic mass of carbon	12.00
AM _H	kg/kmol (g/mol)	Atomic mass of hydrogen	1.01
AM _O	kg/kmol (g/mol)	Atomic mass of oxygen	16.00
AM _N	kg/kmol (g/mol)	Atomic mass of nitrogen	14.01
P _{ref}	Pa	Atmospheric pressure at reference conditions	101 325
R _u	Pa.m ³ /kmol.K	Universal ideal gas constant	0.008314472
T _{ref}	K	Temperature at reference conditions	273.15
VO _{2,air}	Dimensionless	O ₂ volumetric fraction of air	0.21
GWP _{CH4}	t _{CO2} /t _{CH4}	Global warming potential of methane valid for the commitment period	see table above
MV _n	m ³ /Kmol	Volume of one mole of any ideal gas at reference conditions	22.414
ρ _{CH4, n}	kg/m ³	Density of methane gas at reference conditions	0.716
NA _{i,j}	Dimensionless	Number of atoms of element j in component i, depending on molecular structure	
VM _{ref}	m ³ /kmol	Volume of one mole of any ideal gas at reference temperature and pressure	22.4

Monitored parameters:

Parameter	Description	Value		Source
<i>IEC_{Pt}</i>	Imported electricity consumption in period t of project scenario.	MONTH	Electrical Power Consumption [kWh]	Electric meter at the commercial border or reception energy point to the facility.
		FEB	478.0	
		MAR	485.0	
		APR	1,345.0	
		MAY	794.0	
		JUN	509.0	
		JUL	7,145.0	
		AUG	18,509.0	
		SEP	4,934.0	
		OCT	3,671.0	
		NOV	1,388.0	
		DEC	11,724.0	
		Total	50,982	
<i>ECBL_{j,t}</i>	Electricity that would be consumed by user j in the baseline scenario in period t, expected to be displaced by the project.	MONTH	Electrical Power Generation [kWh]	Electric meter at the commercial border or reception energy point to the facility.
		FEB	285,111.5	
		MAR	389,185.3	
		APR	317,388.6	
		MAY	359,357.7	
		JUN	285,682.4	
		JUL	161,200.7	
		AUG	390,871.6	
		SEP	380,248.0	
		OCT	1,181,863.0	
		NOV	1,204,394.2	
		DEC	1,126,510.6	
		Total	6,081,813	
<i>ηMDP_{m,t}</i>	Flare methane destruction efficiency in minute m in period t in project scenario.	In the baseline scenario, flare efficiency of 99% is used (specified for manufacturer equipment). In the project		

		scenario is calculated minute-by-minute.	
TEG,m	Temperature in the exhaust gas of the enclosed flare in minute m	-	Thermocouple type N. Recorded minute-by-minute.
$v_{iRG,m}$	Volumetric fraction of component i in the residual dry gas in minute m,	-	Data logger.
$V_{RG,tb,m}$	Volumetric flow of the residual gas (LFG) on a dry basis in the minute m (m^3 dry gas/m) for each flare	-	Measured by flow meters. Data is aggregated monthly and yearly
$V_{O_2eEG,m}$	Volumetric fraction of O2 in the exhaust gas on a dry basis at reference conditions in minute m	-	Gas analyzer
$f_{c_{CH_4,FG,h}}$	Concentration of methane in the exhaust gas of the flare in dry basis at reference conditions in the minute m	-	Continuous gas Analyzers
$V_{tb,m}$	Volumetric flow of the LFG stream in time interval t on a dry basis in the hour h (m^3 dry gas/h) for each power generator	-	Measured by flow meters. Data is aggregated monthly and yearly
T_f, T_{EG}, T_{HG}	Temperature of the landfill gas at the proximity of each flow meter, if volumetric flow meter are used:		Temperature transisor
<i>EFIGt</i>	CO2 emission factor of interconnected grid for period t.	0.586 tCO₂e/MWh	UPME for 2023. Published in its Resolution 1198 of December 26th, 2024.
<i>EFGSPt</i>	CO2 emission factor for the electric grid or electricity supplier in period t in project scenario.	0.723 tCO₂e/MWh	XM – Operator National Interconnected System. Statistics and Indicators web - Sinercox
<i>TDTLj,t</i>	Average technical	7.51%	The value used is

	transmission and distribution losses for electricity supply from the electric grid or an electricity supp		calculated by Enel Colombia S.A ESP – Distribution Grid Operator for Cundinamarca and Bogotá, and published in the annual report for 2024.
<i>TDTP_{j,t}</i>	Average technical losses for electricity transmission and distribution to grid user j in period t.	7.51%	The value used is calculated by Enel Colombia S.A ESP – Distribution Grid Operator for Cundinamarca and Bogotá, and published in the annual report for 2024.
SPECflare	Manufacturer’s flare specifications for temperature, Flow rate and maintenance schedule	<ul style="list-style-type: none"> • Temperature: >800 °C – 1,200 °C • Flow rate: 1,000 - 5,000 Nm³/h (functioning limits 20% - 100%) • Maintenance schedule - annually 	Document by flare manufacturer (Chapter 3.1.5)

Installed Meters and Calibration Details

Data / Parameter	Brand	Technology	Model	No. Series	Código del Certificado	Calibration Execution Date	Next Calibration Date
Volumetric Flow Rate - Main Collector	PFS	Venturi Tube	24" HVT-PI	12157	N.A.	Calibration is not necessary, only replacement in case of damage to the Venturi	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7B1BAAA	AB08FB0109D	CAL 15: ILM23 - CC72276 - 0 CAL 16: ILM24 - CC77280 - 0	10/11/2023 06/11/2024	09/11/2024 05/11/2025

	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7D1BAAA	C603020109D	CAL 15: ILM23 - CC72275 - 0 CAL 16: ILM24 - CC77281 - 0	10/11/2023 06/11/2024	09/11/2024 05/11/2025
Temperature - Main Collector	Endress + Hauser	Sensor Digital	iTEMP PA TMT84-B5A2A	AB00DA042B6	CAL 15: LT-7613-23 CAL 16: LT-7794-24	08/11/2023 06/11/2024	07/11/2024 05/11/2025
Absolute Pressure - Main Collector	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC41-NE22H1P11A1	AB02E501020	CAL 3: ILM23 - CC72277 - 0 CAL 4: ILM24 - CC77282 - 0	10/11/2023 06/11/2024	09/11/2024 05/11/2025
Concentration of CH4 // vi, RG, m	ABB	Infrared Analyzer	AO 2000 Series Uras 26	3.357394.8	CAL 15: DSFQ-027-23 CAL 16: DSFQ-009-24	09/11/2023 08/11/2024	08/11/2024 07/11/2025
Concentration of CO2 // vi, RG, m				3.357394.8			
Concentration of O2 // vi, RG, m		Oxygen Sensor	AO 2000 Series O2 Sensor	3.357397.8			
Volumetric Flow Rate - Flare BG1: VRG, m	PFS	Venturi Tube	10" HVT-PI	12158-1	N.A.	Calibración is not necessary, only replacement if the Venturi is damaged	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7B1BAAA	AB08FC0109D	CAL 15: ILM23 - CC72263 - 0 CAL 16: ILM24 - CC77284 - 0	09/11/2023 06/11/2024	08/11/2024 05/11/2025
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7D1BAAA	C603040109D	CAL 15: ILM23 - CC72267 - 0 CAL 16: ILM24 - CC77285 - 0	10/11/2023 06/11/2024	9/11/2024 05/11/2025
Gas Temperature - Flare BG1: Tf	Endress + Hauser	Sensor Digital	iTEMP PA TMT84-B5A2A	AB00DF042B6	CAL 15: LT-7614-23 CAL 16: LT-7795-24	08/11/2023 06/11/2024	07/11/2024 05/11/2025
Absolute Pressure - Flare BG1: Pf	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC41-NE22H1P11A1	AB02E601020	CAL 1: ILM23 - CC72268 - 0 CAL 2: ILM24 - CC77283 - 0	10/11/2023 06/11/2024	9/11/2024 05/11/2025
Combustion Temperature - Flare BG1: TEG, m	FFON-SECA	N-Type Temperature Sensor	Type N	20220602 2300893001	VER 13: DST-0093-23 VER 14: TT-0244-24	02/05/2023 09/05/2024	01/05/2024 08/05/2025
Volumetric Flow Rate -	PFS	Venturi Tube	10" HVT-PI	12158-2	N.A.	Calibración is not necessary, only	

Flare BG2: VRG, m						replacement if the Venturi is damaged	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7B1BAAA	AB08FD0109D	CAL 15: ILM23 - CC72258 - 0 CAL 16: ILM24 - CC77329 - 0	08/11/2023 08/11/2024	07/11/2024 07/11/2025
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7D1BAAA	C603030109D	CAL 15: ILM23 - CC72257 - 0 CAL 16: ILM24 - CC77328 - 0	09/11/2023 06/11/2024	08/11/2024 05/11/2025
Gas Temperature - Flare BG2: Tf	Endress + Hauser	Sensor Digital	iTEMP PA TMT84-B5A2A	AB00DC042B6	CAL 15: LT-7615-23 CAL 16: LT-7796-24	09/11/2023 06/11/2024	08/11/2024 05/11/2025
Absolute Pressure - Flare BG2: Pf	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC41-NE22H1P11A1	AB02E301020	CAL 3: ILM23 - CC72262 - 0 CAL 4: ILM24 - CC77330 - 0	09/11/2023 08/11/2024	08/11/2024 07/11/2025
Combustion Temperature - Flare BG2: TEG, m	FFON-SECA	N-Type Temperature Sensor	Type N	20220604 2300893003	VER 15: DST-0095-23 VER 16: TT-0243-24	2/05/2023 09/05/2024	1/05/2024 08/05/2025
Volumetric Flow Rate - Flare BG3: VRG, m	PFS	Venturi Tube	10" HVT-PI	13386	N.A.	Calibración is not necessary, only replacement if the Venturi is damaged	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7B1BAAA	D605060109D	CAL14: ILM23 - CC72245 - 0 CAL 15: ILM24 - CC77331 - 0	08/11/2023 08/11/2024	07/11/2024 07/11/2025
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7D1BAAA	D605070109D	CAL 14: ILM23 - CC72232 - 0 CAL 15: ILM24 - CC77332 - 0	08/11/2023 08/11/2024	07/11/2024 07/11/2025
Gas Temperature - Flare BG3: Tf	Endress + Hauser	Sensor Digital	iTEMP PA TMT84-B5A2A	D7004D042B6	CAL 15: LT-7611-23 CAL 16: LT-7797-24	07/11/2023 06/11/2024	06/11/2024 05/11/2025
Absolute Pressure - Flare BG3: Pf	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC41-NE22H1P11A1	J400EA15128	CAL 10: ILM23 - CC72246 - 0 CAL 11: ILM24 - CC77335 - 0	08/11/2023 06/11/2024	07/11/2024 05/11/2025

Combustion Temperature - Flare BG3: TEG, m	FFON-SECA	N-Type Temperature Sensor	Type N	20220606 2300893002	VER 15: DST-0094-23 VER 16: TT-0242-24	2/05/2023 09/05/2024	1/05/2024 08/05/2025
Concentration of CH4 - fcCH4,EG, m	ABB	Infrared Sensor	AO 2000 Series Uras 26	3.357396.8	CAL15: DSFQ-028-23 CAL 16: DSFQ-008-24	09/11/2023 08/11/2024	08/11/2024 07/11/2025
Concentration of O2 - vo2,EG,m		Oxygen Sensor	AO 2000 Series O2 Sensor	3.357399.8			
Volumetric Flow Rate - Generator GE1: VRG, m	Endress + Hauser	Orifice Plate	Deltatop DO63C	D100330111B	N.A.	Calibration is not necessary, only replacement in case of damage to the orifice plate	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-70A7B1BAAA	D2058B0109D	CAL 15: ILM23 - CC72219 - 0 CAL 16: ILM24 - CC77276 - 0	07/11/2023 06/11/2024	06/11/2024 05/11/2025
Gas Temperature - Generator GE1: TG	Endress + Hauser	Thermal Resistance	PT100 / TR12	D20115142FE	CAL 14: LT-7612-23 CAL 15: LT-7792-24	07/11/2023 06/11/2024	06/11/2024 05/11/2025
Absolute Pressure - Generator GE1: PEG	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC51-1PD0/115	D2002401128	CAL 14: ILM23 - CC72220 - 0 CAL 15: ILM24 - CC77277 - 0	07/11/2023 06/11/2024	06/11/2024 05/11/2025
Volumetric Flow Rate - Generator GE2: VRG, m	Endress + Hauser	Orifice Plate	Deltatop DO63C	D100330111B	N.A.	Calibration is not necessary, only replacement in case of damage to the orifice plate	
	Endress + Hauser	Differential Pressure Transmitter	Deltabar S PMD70-ECJ788DAAA	D2058C0109D	CAL 4: ILM23 - CC72230 - 0 CAL 5: ILM24 - CC77279 - 0	08/11/2023 06/11/2024	07/11/2024 05/11/2025
Gas Temperature - Generator GE2: TG	Endress + Hauser	Thermal Resistance	PT100 / TR12	D202A114152	CAL 4: LT-7616-23 CAL 5: LT-7793-24	09/11/2023 06/11/2024	08/11/2024 05/11/2025
Absolute Pressure - Generator GE2: PEG	Endress + Hauser	Metal & Ceramic Sensor	Cerabar M PMC51-1PD0/115	D2002501128	CAL 4: ILM23 - CC72221 - 0 CAL 5: ILM24 - CC77278 - 0	07/11/2023 06/11/2024	06/11/2024 07/11/2025

Volumetric Flow Rate - Generator GE3: VRG, m	PFS	Insert Venturi	5" HVT-FVF	25298-01-02	N.A.	Calibration is not necessary, only replacement if the Venturi is damaged	
	Endress + Hauser	Differential pressure transmitter	Deltabar S PMD75B-2EP71/101	VC02200119A	FINAL INSPECTION REPORT No: 3040013128/0040	21/12/2023	16/11/2024
Gas Temperature - Generator GE3: TG	Endress + Hauser	Thermal-Resistance	PT100 / TM131	VC05BB1448A	FACTORY CALIBRATION CERTIFICATE No: VC05BB1448A-2024	17/01/2024	16/11/2024
Absolute Pressure - Generator GE3: PEG	Endress + Hauser	Ceramic and Metal Sensor	Cerabar M PMC51B-183N0/101	VC012701195	FINAL INSPECTION REPORT No: 3040013128/0010	12/12/2023	16/11/2024
Volumetric Flow Rate - Generator GE4: VRG, m	PFS	Insert Venturi	5" HVT-FVF	25298-01-01	N.A.	Calibration is not necessary, only replacement if the Venturi is damaged	
	Endress + Hauser	Differential pressure transmitter	Deltabar S PMD75B-2EP71/101	VC021F0119A	FINAL INSPECTION REPORT No: 3040013128/0040	21/12/2023	16/11/2024
Gas Temperature - Generator GE4: TG	Endress + Hauser	Thermal-Resistance	PT100 / TM131	VC05BC1448A	FACTORY CALIBRATION CERTIFICATE No: VC05BC1448A-2024	17/01/2024	16/11/2024
Absolute Pressure - Generator GE4: PEG	Endress + Hauser	Ceramic and Metal Sensor	Cerabar M PMC51B-183N0/101	VC012801195	FINAL INSPECTION REPORT No: 3040013128/0010	12/12/2023	16/11/2024

Energy Generation to the Electrical Grid: IECP_t	iTRÓN	Measurement Analyzer	SL7000	73048827 (principal) 73049424 (respaldo)	ME-2203-29482 (Principal) ME-2203-29516 (Respaldo)	08/03/2022 25/03/2022	07/03/2026 26/03/2026
	iTRÓN	Measurement Analyzer	ACE6000	84587967	CAL1: ME-2012-27762 CAL2: 241212-24695	29/12/2020 12/12/2024	28/12/2024 11/12/2028
	Elster	Measurement Analyzer	A1800	02918718	ME-2208-30197	25/08/2022	24/08/2026
Energy Consumption from the Grid: ECBL_j,t	Carlo Gavazzi	Power Quality Analyzer	WM396AV53LA1S1	BJ1240052001P	CAL 9: SM.LIME.0232.2022	25/07/2022	24/07/2026

In relation to instruments calibration, manufacturer states in the specifications and recommendations, calibration frequency is selected by user based on its own use and requirements. In general, our calibration and monitoring plan established annual replacement (only if it's necessary) or annual calibration for: gas analyzers, flowmeters, temperature and pressure transmitters, and combustion thermocouples. Electrical meters shall be calibrated according to resolution CREG 038 of 2014 or national regulation in this regard.

According to Biogás Colombia Quality Management System, calibration should be performed as close as possible to the date of commissioning, reinstallation, or first use; from this date will begin counting the calibrations annual validity. It is suggested that field calibrations be performed for instruments or meters where technically feasible. If necessary, Instruments shall be stored in appropriate conditions according to the manufacturer's recommendations, so as not to affect their calibration conditions or factory settings. Attached to the monitoring report is the Excel file "BGC - RM10 Data and parameter v1.xls" containing the additional data or parameters that must be monitored in the PMCC

12 Information management

The selection of information for baseline calculations corresponds to studies or official information prepared by the entities designated for each activity, minimizing uncertainty.

For the operation data of the landfill, official information from the special Administrative Unit of Public Services UAESP or the Temporary Union Inter DJ – UT-INTER DJ is used.

As the entity is in charge of supervising the project in the landfill. For the calculations of emission factors, the XM and UPME source is used, responsible at the national level for issuing said factors. For the technical and legal evaluation of the operation of the project in the financial framework, the studies of the Water and Sanitation Regulation Commission (CRA) are sent, the entity in charge at the national level of regulating the rates of water and sanitation services.

Regarding the operation data in the project scenario, all records are stored in raw data (Raw Data) and minute-by-minute records are obtained for the majority of operation data, the equipment is calibrated according to the manufacturers' criteria and the equipment used has low uncertainty.

13 Annexure (Safeguarding Principles and Procedures)

With reference of Safeguarding Principles and Procedures of Cercarbono's Certification Programme (Ver 1.0⁵), the below table provide the assessment of Safeguard Principles established by Cercarbono's Voluntary Carbon Certification Programme in reference to project case.

Parameter	Risks identified	Mitigation or preventative measure taken
Environmental Safeguarding Principles		
1. Biodiversity Conservation and Sustainable Management of living environmental components		
1a. Genetic resources.	No Risk Identified	The project activity does not impact Genetic resources nearby.
1b. Endangered species	No Risk Identified	Project is not located in or adjacent to habitats for rare, threatened, or endangered species
1c. Dignified treatment of animals.	No Risk Identified	The project activity does not involve any animals and also strictly follow animal protection policy.
2. Natural heritage	No Risk Identified	The project activity does not impact the tangible or intangible cultural heritage or Natural heritage nearby
3. Sustainable management of Non-living environmental components		
3a. Water	No Risk Identified	The water consumption is reasonable and been approved, the CCMP has management indicators to measure this consumption. No water consumption and stress risk. The activity does not generate discharges or waste that could affect nearby water sources.
3b. Soil.	No Risk Identified	This project activity has no effect on soil degradation or erosion

⁵ <https://www.cercarbono.com/wp-content/uploads/2023/03/2023.03.24-Safeguarding-principles-and-procedures-of-Cercarbono-V1.0.pdf>

3c. Landscape	No Risk Identified	No impact on landscape is envisaged for the project. On the contrary, much of the facility's infrastructure is built on areas that were used as landfill cells, giving better use of the land.
4. Pollution, pesticides, and fertilizers		
4a. Pollution	No Risk Identified	The implementation of the project at the Doña Juana landfill also created additional environmental improvements and made a positive contribution to the global problem of climate change by reducing greenhouse gas emissions. Additionally, with the treatment and use of biogas, bad odors and pollutants are prevented from being vent into the atmosphere.
4b. Pesticides and fertilizers.	No Risk Identified	No Pesticides or Fertilizers are used in project activity
Social safeguarding principles		
5. Gender equality and human rights	No Risk Identified	The project strictly follows the national laws promoting the gender equality in labor and work, and commits that equal opportunities have been or will be provided in the context of gender equity and pay for labor and work. A large percentage of leadership positions are held by women.
6. Cultural heritage	No Risk Identified	The project activity does not impact the tangible or intangible cultural heritage or Natural heritage nearby
7. Communities and Indigenous Peoples	No Risk Identified	The project activity does not impact the tangible or intangible cultural heritage or the indigenous people nearby.

		<p>According to the stakeholder consultation, the surrounding communities agree with the activity. In addition to the positive environmental impacts of the CCMP, it generates positive social and economic impacts that contribute to improving the quality of life of the residents near the landfill.</p>
8. Land acquisition and involuntary resettlement	No Risk Identified	<p>The land / property for the project activity belongs to Bogota's district, and it is owned by the project proponent under a concession contract. It can be supported through the relevant documents. This ensures that surrounding communities' property rights are protected and respected.</p>
9. Health, safety, and security	No Risk Identified	<p>The project strictly follows the national laws related to Health, safety, and security. The CCMP has certifications under the ISO 9001 and ISO 14001 standards, which guarantee compliance with these regulations.</p>
10. Corruption	No Risk Identified	<p>The CCMP strictly follows the national laws related to anti-corruption policy. The project is under the continuous monitoring of an audit concession and different control entities in economic, fiscal and operational aspects.</p>
11. Legal compliance	No Risk Identified	<p>All regulatory compliance has been taken by the project activity. The CCMP is under the strict supervision of environmental regulatory entities, the Colombian electricity sector and carbon markets.</p>
Economic safeguarding principles		

<p>12. Negative economic consequences</p>	<p>No Risk Identified</p>	<p>The project activity generates permanent and temporary employment opportunity within the vicinity of the project, improving social conditions.</p> <p>The electricity supply in the nearby area improves the technical qualities of the distribution networks in the southern area of the city of Bogotá. The project does not generate any type of expenses for the city of Bogota or its inhabitants. On the contrary, a large part of the economic resources obtained from the activity are destined for the execution of social projects that benefit the communities impacted by the sanatorium landfill activity.</p>
<p>13. Labor rights</p>	<p>No Risk Identified</p>	<p>The project strictly follows the national laws prohibiting discrimination and hence no discrimination has occurred or will occur in the future. CCMP's internal policies guarantee compliance with current Colombian regulations in this regard. The modality labor contract guarantees job stability for employees and compliance with their rights.</p>

Attached to the monitoring report is the safeguards statement, which describes the evidence of compliance with the above.

14 References

- CERCARBONO Methodology M/LFM-DE_RE01 For Projects for the Destruction and Utilization of Biogas from Landfill Sites. Version 2.1
- CERCARBONO Protocol for Voluntary Carbon Certification of CERCARBONO CVCC. Version 4.4
- CERCARBONO Guidance on the Use of Global Warming Potential (GWP) Values. Version 2.0
- IPCC. (2006). IPCC 5th Assessment. Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston HS, Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Tokyo, 2006.
- IPCC(2019). Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). Published: IPCC, Switzerland.
- ISO 14064-2:2019. Greenhouse gases —Specification with guidance, at the project level, for the quantification, monitoring and reporting of emissions reductions or increases in greenhouse gas removals. Ministry of Mines and Energy. (2014). CREG Resolution 038 of 2014, by which the measurement code contained in the General Annex of the networks code is modified. 65 p.
- UNFCCC, ACM0001 Large-scale Consolidated Methodology: Flaring or use of landfill gas. Version 19.0. Clean Development Mechanism
- UNFCCC, Tool 04 “Emissions from solid waste disposal sites. Methodological tool. Version 08.0. Clean Development Mechanism”.
- UNFCCC, Tool 06 “Project emissions from flaring. Methodological tool. Version 03.0. Development Mechanism
- UNFCCC, Tool 07 “to calculate the emission factor for an electricity system. Methodological tool. Version 07.0. Clean Development Mechanism
- UNFCCC, Tool 08 “Tool to determine the mass flow of a greenhouse gas in a gaseous stream. Methodological tool. Version 03.0. “Clean Development Mechanism”
- CRA, Commission for the Regulation of Drinking Water and Basic Sanitation. Diagnosis and identification of problems, objectives, alternatives, evaluation and selection of alternatives, implementation and monitoring.
- Mayor's Office of Bogotá – Special Administrative Unit of Public Services UAESP; Plan of Comprehensive Solid Waste Management – PGIRS 2020
- XM – Operator National Interconnected System. Statistics and Indicators web - Sinergox

15 Document history (Monitoring Report)

Version	Date	Comments or editions
1.0	27.05.2025	Initial document version.
2.0	20.06.2025	Adjustments according to audit findings.

16 Template history

Version	Date	Comments or editions
1.0	30.10.2019	Initial version.
1.0.1	25.10.2021	Change of logo in the Excel template.
2.0	31.01.2022	Change of format (from Excel to Word), redesign and improvement of content. Addition of filling instructions in each section.
3.0	01.08.2022	Content adjustments and editorial changes.