PICHACAY LANDFILL GAS RENEWABLE ENERGY PROJECT

MONITORING REPORT

Project title	Pichacay Landfill Gas Renewable Energy Project
Project ID	1883
Monitoring period	01-January-2023 to 31-December-2023 (both days included)
Original date of issue	25-October-2024 is the date the monitoring report was completed following the completion of the audit.
Most recent date of issue	20-February-2025 is the date on which the document was most recently submitted
Version	1.7
VCS Standard Version	v4.7
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PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

At the Pichacay landfill municipal solid waste (MSW) from the city of Cuenca in Ecuador is disposed. In the landfill, landfill gas (LFG) (rich in methane (CH_4)) is generated. Prior to the project implementation, generated LFG was directly released into the atmosphere. The project involves the implementation of a LFG collection network with horizontal and vertical wells, a biogas pumping station, an electricity generation infrastructure (encompassing the gradual/phased implementation of 4 engine-generator sets of a nameplate installed capacity of 0.85 MWe each), a flare and a power transformer to 22 kV. Please note that under standard operational conditions the engine-generator sets have an original power of 1 MWe each, but these capacities have been reduced to 0.85 MWe under operational circumstances because of the high altitude of the site where the VCS project activity is implemented.

The VCS project activity thus promotes collection and destruction/utilization of LFG that would otherwise be directly emitted to the atmosphere, thus promoting real, permanent and measurable reduction of CH_4 emissions. By generating electricity from a renewable energy source, displacement of equivalent amount of electricity that would be otherwise generated in existing grid-connected electricity generation sources (including fossil fuel fired power plants) and addition of new electricity generation sources occurs, thus promoting real and permanent CO_2 emission reductions. The landfill - without any pre-project landfill gas recovery system being available – has been under operation since the year 2001.

An Environmental Impact Assessment (EIA) and other needed permissions for LFG extraction and renewable electricity generation were obtained in year 2014. The VCS project activity was constructed and commissioned between years 2014 and 2017 and started commercial operation (with one engine-generator set being under operational status) on 27-July-2017.

The second engine-generator was commissioned from May to mid June 2021. The experimental operation period occurred from 20-July-2021 to 02-August-2021. The second engine-generator set received its commercial operation declaration by 01-October-2021, after which the electricity is sold to the grid. Between 14 March 2023 and 23 March 2023 there was a maintenance period, in which with both engines-generators did not produce electricity. Between 23-April-2023 and 30-April-2023 there was another regular maintenance period due to 5,000 operational hours, in which the internal components of the engine-generators were decarbonized. On 09-May-2023 the second engine-generator was severely damaged and has not been operational between 10-May-2023 and 31-December-2023. Retake of electricity production with the second engine-generator is expected from March 2024 onwards. Between 10-May-2023 and 04-June-2023 both engine-generators did not produce electricity were not operational. From 05-June-2023 on, engine-generator 1 was again operational. Since landfill gas supply was not enough to run two engines and because engine-generator 1 was operational, the impact of the damage to engine 2 on the emissions reductions achieved was limited.

The installation of engine-generator set 3 is planned to occur in the year 2026, provided that the project is able to increase the landfill gas yield in 2024. The investment decision for engine-generator 3 will be taken in 2025. The date of installation of Engine-generator set 4 has not been

confirmed yet. Engine-generator sets 3 and 4 are not part of the monitoring period 01-January-2023 – 31-December-2023.

The VCS project activity is located in Santa Ana, city of Cuenca, province of Azuay, in Ecuador.

During the monitoring period from 1-January-to 31-December-2023, a total emission reduction of **24,801 tCO_2e** was achieved.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Combined validation and first verification	27-July-2017 to 31-December-2018	VCS	EPIC Sustainability Services Pvt. Ltd.	Two years
Verification	01-January-2019 to 31-December-2020	VCS	LGAI Technological Center, S.A. (APPLUS+)	Two years
Verification	01-January-2021 to 25-August-2021	VCS	LGAI Technological Center, S.A. (APPLUS+)	2/3 year
Verification	01-January-2023 to 31-December-2023	VCS	LGAI Technological Center, S.A. (APPLUS+)	One year

Please note that the project proponent has chosen not to monitor the period from 26-August-2021 to 31-December-2022, as the project received a performance incentive from the Andean Development Corporation, in the frame of the PBC Facility (further referred to as CAF-agreement). See "*1. Acuerdo_de_Desempeno_Cuenca_CAF_-_V4__22JUL2021_EN.pdf*" This performance incentive is based on the CO_2 reduction achieved by the project between 26-August-2021 and 31-December-2022. No formal GHG certificate was issued, but a GHG calculation was made to determine the size of the performance incentive. The performance initiative does not allow transfer of emissions reductions achieved in this period, for example via voluntary market mechanisms.

No double counting occurred since the project did not claim emission reductions under the VCS scheme within the period 26 August 2021 to 31 December 2022, while the CAF-agreement is solely based on emission reductions achieved within the period 26 August 2021 to 31 December 2022. See section 1.10 for further information.

The VCS Standard version 4.7, § 3.5.7 states that *"Grouped projects, AFOLU projects, and other projects with a risk of a reversal or loss event shall not have gaps between monitoring periods."* Since the project is not a grouped project, AFOLU project or other project with a risk of reversal or loss event, a gap in monitoring period is allowed.

1.3 Sectoral Scope and Project Type

Sectoral scope[1]	13 & 1, Waste handling and disposal & Energy (renewable/non-renewable)
Project activity type	Type-III Other project & Type-I Renewable Energy Project

1.4 Project Proponent

Organization name	EMAC-BGP ENERGY COMPAÑÍA DE ECONOMÍA MIXTA CEM
Contact person	Mr. David González Hidalgo
Title	General manager
Address	Edif. Esquina, Segunda planta alta Av. Remigio Crespo y La Española Cuenca Ecuador
Telephone	+593 7-284-1806
Email	david.gonzalez@ebe.com.ec

1.5 Other Entities Involved in the Project

Organization name	EMAC EP
Role in the project	Main Partner of project proponent
Contact person	Francisco Serrano Salgado
Title	Technical Director
Address	Av. Tres de Noviembre 21-176 y Juan Pablo I Cuenca Ecuador
Telephone	+(593) 07 2840045 / 2827188 / 2848194
Email	fserrano@emac.gob.ec

[1] *Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes*

Organization name	BGP Engineers B.V.
Role in the project	Main partner of project proponent, project developer
Contact person	Jilles Nijboer
Title	General Director
Address	Boterpotten 6, NL-4731 NX Oudenbosch, Netherlands
Telephone	+31 6 5572 2770
Email	j.nijboer@ees-energyneers.com

Organization name	BTG Biomass Technology Group B.V.
Role in the project	Consultant
Contact person	Martijn Vis
Title	Senior consultant
Address	Josink Esweg 34, 7545 PN, Enschede, The Netherlands
Telephone	+31 53 486 1193
Email	vis@btgworld.com

1.6 Project Start Date

Project start date	27-July-2017
Justification	This is the official date of entry into commercial operation of the plant. VCS Standard, Version 3.7, article 3.7.2 states that *"Non-AFOLU projects shall complete validation within two years of the project start date"*. The first version of the Joint Validation & verification report was issued on 20-July-2019 (See *"41. Joint validation & verification report 20 July 2019.pdf"*), which is within two years of the project start date. Please note that this first version of the Joint Validation & verification report issued on 20-July-2019 was uploaded to the APX registry (the predecessor of the VERRA registry) on 24-July-2019. This can be proven by two emails from VERRA dated 24-July-2019 confirming a change of status of the project induced by uploading the Joint Validation and verification report, the validation deed,

	verification deed, registration deed, issuance deed, and the joint project description and monitoring report (See "43. Email APX VCS Registry - Project Status Change 24 July 2024.pdf"). The second version of the Joint Validation and verification report was issued and uploaded to the APX registry by VERRA on 27-August-2019 after completion of the VERRA accuracy review with date of first issuance of 22-August-2019 and final date of issuance of 27-August-2019. The VCS project review report has been uploaded to the Verra registry (See R&I1_PRR_PL1883_27 AUG 2019.pdf). Apparently, the first version of the Joint Validation and verification report of 20-July-2019 has been removed from the APX VCS registry. After the VERRA accuracy review, the corrected version of the Joint Validation & verification report issued on 27-August-2019 was uploaded by VERRA to the APX VCS registry on 27-August-2019. Unfortunately, VVB EPIC has not updated the version number, meaning that both the version of the Joint validation & verification report of 20-July-2019 and the version of 27-August-2019 have version 1.0 as version number. The dates of issuance, however, clearly distinguish both versions of the report.

1.7 Project Crediting Period

Crediting period	☐ *Seven years, twice renewable* ☐ *Ten years, fixed* ☒ *Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)* The project proponent has chosen a renewable crediting period of 10 years. The crediting period can be renewed 2 x 10 years. Projects that completed within six (6) months of the release of VCS standard version 4 are eligible to apply the crediting period requirements of the applicable previous version of the VCS standard. VCS Standard version 4.0 was released on 19 September 2019, while the first version of the Joint Validation & Verification report prior to VERRA accuracy review was issued on 20-July-2019 (See *"41. Joint validation & verification report 20 July 2019.pdf")*, following the crediting periods as found in VCS Standard version 3.7. As explained in the justification in paragraph 1.6 "start date", this version of the Joint Validation and & verification report, has been uploaded to the APX VCS registry on 24-July-2019, but is not available anymore in the

	VERRA registry. It has been replaced by the version of the Joint validation and verification report issued on 27-August-2019.
Start and end date of first or fixed crediting period	27-July-2017 to 26-July-2027

1.8 Project Location

The VCS project activity is located at Santa Ana, Cuenca, Azuay, Ecuador.

Geographical Coordinates:

Lat = -2.9660411,

Long = -78.9314400

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version

Methodology	AMS-III.G	Landfill methane recovery	10.0
Methodology	AMS-I.D	Grid connected renewable electricity generation	18.0
Methodology	AMS-III.H	Methane recovery in wastewater treatment	19.0
Tool	Tool04	Emissions from solid waste disposal sites	08.0
Tool	Tool05	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	03.0
Tool	Tool06	Project emissions from flaring	02.0.0
Tool	Tool07	Tool to calculate the emission factor for an electricity system	05.0
Tool	Tool32	Positive list of technologies	01.0

Please note that within the Joint project description & monitoring report of 7-July-2019, reference was made to AMS-III.H (version 19.0) to determine the applicability of AMS-III.G (version 10.0), as stipulated in AMS-III.G (version 10.0) paragraph 3 as follows: *"Different options to utilize the recovered landfill gas as detailed in paragraph 4 of "AMS-III.H.: Methane recovery in wastewater treatment" (version 19.0) are eligible for use under this methodology. The relevant procedures in AMS-III.H. shall be followed in this regard*." Secondly, AMS-III.H (version 19.0), Annex I is used to describe emissions from the landfill gas upgrading process ($PE_{process,y}$) However, within the Joint project description & monitoring report it is concluded that landfill gas upgrading is not applicable in the project, and therefore $PE_{process,y}$ =0. Therefore AMS-III.H is not used as parameter either in the ex-ante emission reduction calculation in the joint project description & monitoring report nor in the subsequent monitoring reports.

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☒ Yes ☐ No

Based on the emission reductions achieved within the period 26-August-2021 to 31-December-2022, the project received a performance incentive from the Andean Development Corporation, in the frame of the PBC Facility (CAF-agreement). This CAF-agreement can be seen as another GHG Program, i.e. *"a formal or organized program, system, or arrangement for the recognition*

of activities leading to GHG emission reductions or carbon dioxide removals and/or the crediting or issuance of instruments representing, or acknowledging GHG emission reductions or carbon dioxide removals". Following VCS Standard, v4.7, article 3.23.2, below, the following information is provided of the CAF-agreement:

1. *Name and contact information of the administrator:* Andean Development Corporation, CAF's Sustainability, Inclusion, and Climate Change Department in the City of Quito, Avenida Simón Bolívar S / N and Vía Nayón, Ekopark Corporate Complex. Tower 5, 8th floor. infocaf@caf.com, +58 2122092111.
2. *Details of participation under the program* can be found in the CAF-agreement "ACUERDO DE DESEMPEÑO ENTRE LA CORPORACIÓN ANDINA DE FOMENTO, EL GOBIERNO AUTÓNOMO DESCENTRALIZADO MUNICIPAL DE CUENCA Y EMAC - BGP ENERGY COMPAÑÍA DE ECONOMÍA MIXTA CEM" *(See 1. Acuerdo_de_Desempeno_Cuenca_CAF_-_V4__22JUL2021.pdf).* In the CAF-agreement the Andean Development Corporation, the Autonomous Decentralized Municipal Government of the canton Cuenca, and EMAC-BGP Energy CEM (the project proponent) agreed on the allocation and transfer of Performance Incentives for EBE CEM's Mitigation Activity related to emission reductions generated by the project between the date of signature of the CAF-agreement (26-August-2021) and 31-December-2022. The CAF-agreement is a financial incentive, and although the emission reductions are monitored and described in Monitoring Reports and confirmed by Verification Reports written by an independent third party hired by CAF, it results in a financial incentive and not in (tradeable) carbon offsets.
3. *Details of the vintage period(s), volume(s), serial numbers(s), and all other relevant identification information for emission reductions and removals.* Three vintage periods for determination of the performance incentives were applied, namely:
    - 1st vintage period: 26-August-2021 (date of signature of CAF agreement) to 28-February-2022; Volume: 14,742 tCO_2-eq; See "*35. CAF monitoring report 1st vintage.pdf*" and "*36. CAF verification report 1st vintage.pdf*"
    - 2nd vintage period: 1-March-2022 to 31-August-2022; Volume: 13,523 tCO_2-eq; See "37*. CAF monitoring report 2nd vintage.pdf*" and "*38. CAF verification report 2nd vintage.pdf*"
    - 3rd vintage period: 1-September-2022 to 31-December-2022; Volume: 8,133 tCO_2-eq; See "39*. CAF monitoring report 3rd vintage.pdf*" and "*40. CAF verification report 3rd vintage.pdf*"
    - No serial numbers are applied within the CAF-agreement.
4. *Evidence that the same reductions and removals seeking credit under the VCS Program have not been and will not be counted, used, or credited under the GHG program, or evidence confirming the cancellation and non-use of credits issued under the other GHG program*. **No double issuance occurred** since the project did not claim emission reductions under the VCS scheme within the period 26-August-2021 to 31-December-2022, while the performance incentive of CAF is solely based on emission reductions achieved within the period 26-August-2021 to 31-December-2022. Evidence is found in the CAF agreement (See *"1.*

Acuerdo_de_Desempeno_Cuenca_CAF_-_V4__22JUL2021.pdf") and the monitoring and verification reports (see previous point). In the CAF agreement (Second Clause – definitions) under "Performance incentives", it is stated that "Incentives are calculated based on a fixed unit value during the entire period from the Emission Reduction Accounting Start Date until December 31, 2022". Within the CAF agreement (Second Clause – Definitions) the Emission Reduction Accounting Start Date is defined as "the date on which the Mitigation Activity will begin to operate on a regular basis and, in this way, will generate Emissions Reduction, the date may not be prior to the signing of this Agreement performance" Since the CAF agreement was signed on 26 August 2021, this is the starting date of the period that CAF used to calculate their performance incentive.

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

The CAF-agreement (see section 1.10.1) is a GHG performance-based financial incentive. Within the CAF-agreement no project registration is applied, and no registration number is issued.

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.12 Sustainable Development Contributions

The project involves the implementation of a landfill gas (LFG) extraction network, a power unit to generate electricity and a flare. The LFG extraction network transports the LFG to two engine-generators where the gas is transformed into renewable electricity supplied to the grid. Greenhouse gas emission reductions have been achieved through avoidance of LFG emissions into the atmosphere and by producing renewable energy (SDG 13.0). Renewable electricity has been generated (SDG 7.1) Jobs are created for engineers, in construction and maintenance (SDG 8.5).

SD contribution to national sustainable development priorities

First of all, as of 2020, Ecuador has directly aligned all the objectives, policies and National Development Plan goals with the SDGs, which enabled to identify responsible actors, prioritize and focus resources, as well as strengthen national planning exercises, monitoring and evaluation[2].

In the first NDC[3] of Ecuador, which was declared a State Policy in August 2019[4], the active methane capture and electricity generation from the Pichacay landfill is explicitly mentioned as initiative in the line of action *"promote the active capture of methane in landfills"* showing that the project is in line with Ecuador's climate targets (SDG13). Moreover, in the first NDC of Ecuador the promotion of wind, solar and biogas energy from landfills is mentioned as initiative "non-conventional renewable energy" in the line of action "*promote the use of renewable energy*", (SDG 7.1).

The Ecuadorian Government's "Opportunity Creation Plan 2021 - 2025"[5], sets out three social protection priorities and corresponding targets to be achieved by 2025, notably, reduce the extreme poverty rate from 15.44% to 10.76%, reduce the youth unemployment rate from 10.08% to 8.17%, increase the percentage of persons concerned by contribution-based public social security systems from 37.56% to 41.73%. The jobs created in the project contribute to these national targets (SDG 8.5)

[2] https://sdghub.com/ecuador-cemdes/

[3] It can be found here (in Spanish): https://unfccc.int/NDCREG

[4] https://climatepromise.undp.org/what-we-do/where-we-work/ecuador

[5] https://www.social-protection.org/gimi/ShowCountryProfile.action?iso=EC

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.1	By 2030, increase substantially the share of renewable energy in the global energy mix	Implemented activities to increase	By capturing landfill gas and producing renewable electricity, project 1883 has produced net 4,644 MWh of renewable electricity.	Production of 23,659.71 MWh of renewable electricity.
2)	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.	Implemented activities to increase	No further changes this monitoring period	The project generated 11 jobs.
3)	13.0	Tons of greenhouse gas emissions avoided or removed	Implemented activities to increase	By capturing landfill gas and producing renewable electricity, project 1883 has prevented the release of 24,801 tCO_2-eq into the atmosphere during the monitoring period.	During the VCS project lifetime, i.e. from 27-July-2017 to 25-August-2021 and from 1-January-2023 to 31-December-2023, the project has prevented the release of 117,494 tCO_2-eq into the atmosphere

Evidence substantiating the contribution to the SDGs

The GHG reduction (SDG 13.0) and renewable electricity generation (SDG 7.1) have been obtained from the current and past monitoring reports. The values are displayed in the table below.

	GHG reduction	**Renewable electricity production ($EG_{PJ, facility}$)**
Monitoring period	tCO_2-eq	MWh
27-July-2017 to 31-December-2018	38,259	7,940.95
01-January-2019 to 31-December-2020	42,990	8,930.53
01-January-2021 to 25-August-2021	11,444	2,143.92
01 January 2023 to 31-December-2023	24,801	4,644.31
Total	**117,494**	**23,659.71**

The project proponent EMAC-BGP ENERGY COMPAÑÍA DE ECONOMÍA MIXTA CEM (in short EBE) is a joint venture between EMAC and BGP and its activities are solely dedicated to landfill gas extraction and electricity generation with the produced biogas. Therefore, the 11 employees working for EBE as assessed by EMIS[6] are direct employment generated by the project.

[6] See https://www.emis.com/php/company-profile/EC/Emac_-_Bgp_Energy_Compania_de_Economia_Mixta_Cem_en_3976871.html

1.13 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the monitoring report.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Relevant stakeholders were identified during the "socialization process" as part of the Environmental Impact assessment. This is described in the report *"Informe de Facilitación, prcessa de consulta y participación social"* that was submitted to the validation body during the first joint validation and verification. Identified stakeholders are: • The parish of Santa Ana (parishes are the third-level of administrative units in Ecuador) • Inhabitants of the following communities with the Parish of Santa Ana, in the vicinity of the Pichacay landfill: El Chorro, Playa de los Ángeles and Mosquera. • Direct neighbors adjacent to the EMAC landfill site.
Legal or customary tenure/access rights	There are no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders. The project proponent EBE has the legal right to use the landfill site for the LFG extraction and energy generation as established in the *"Escritura Pública de comadato otorgado por: Empresa publica municipal de aseo de Cuenca EMAC EP a favor de Compañia mixta*

	EMAC-BGP Energy CEM Cuantía: inderterminada". See *"2.EBE Commodate.pdf"* For safety reasons the site is not freely accessible. As stated in the internal labor regulation *"3.reglemento interno de trabajo.pdf"*, EBE staff is not allowed to let unauthorized persons to enter areas classified as restricted.
Stakeholder diversity and changes over time	Information on the stakeholder makeup is available from a census that is held every 10 years. See *"4. Stakeholder make-up.pdf"*. The used census data is collected by INEC, Instituto Nacional de Estadisticas y Censos (National Institute of Statistics and Census) and is publicly available via https://www.censoecuador.gob.ec/data-censo-ecuador/. The population of Santa Ana increased between 2010 and 2021 with 32% from 5338 to 7027 people. In 2001, there were 89 men for every 100 women, but this number had decreased to 84 by 2021. The share of women has been increasing over the years, primarily due to the emigration of men to larger cities within Ecuador and to other countries, particularly the United States. The average age has risen from 27 years in 2021 to 28 years in 2021. With regards to ethnical composition, the 2010 census does not include any information, but the 2021 census states that 98.2% of the population regards itself half-blood. Only 0.2% of the population regards itself indigenous.
Expected changes in well-being	The project avoids the emission of methane, SOx and other odorous gases, which makes the area in the vicinity less odorous, healthier and more pleasant to live in, as described in the Environmental Impact Assessment (See *"5. EIA.pdf"*, factor F13 on page 165).
Location of stakeholders	As described in *"6. Stakeholder consultation report 2013.pdf"* that was established as part of the Environmental Impact assessment, The stakeholders are located in the parish of Santa Ana. The stakeholders located the closest to the landfill live in the three neighboring communities of El Chorro (most close to the Pichacay landfill), Playa de los Ángeles and Mosquera, which are all part of the parish of Santa Ana.

Location of resources	Stakeholders do not own the landfill site, and, for safety reasons, they don't have free access to the landfill site, Visitors have to pass the administrative and control area for entry to the landfill, as shown in https://emac.gob.ec/complejo-humanitario-de-desarrollo-pichacay/.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	The 2019 update of the Environmental Management Plan (***See 7. Environmental management plan 2019.pdf***), contains a "Community relations plan". Measure 1.6.1 requires ***"For external environmental-social communication, there will be a system of registration, control and monitoring of requirements (observations, suggestions, complaints, requests) from social actors, which will be considered to improve the social and environmental management of the Project"***. A record of requirements will be maintained, and improvements in social and environmental management will be implemented where appropriate (Measure MV71 and MV72). The frequency is once per 12 months. In 2023, inhabitants and representatives of the communities of the parish of Santa Ana were invited to visit the project, to discuss the activities, and giving space to stakeholders to discuss any doubt, or any problem related to the project. Neighbors to the site were invited personally, flyers were made and spread. The president of the Santa Ana parish and representatives of the communities were personally invited and were given the opportunity to **tell** their communities about the event.
Date(s) of stakeholder consultation	29-October-2023
Communication of monitored results	During the stakeholder consultation site visit, the monitored results were communicated in the following way: first a tour was performed showing the landfill gas extraction at the

	landfill and the engine-generator, explaining the project. After that the project results were presented in an easy and understandable way, e.g. electricity production (expressed as MWh, but also as consumption of x households) and CO_2 reduction numbers (expressed as CO_2-eq, but also as the emission of y cars), After that a Q&A session was held followed by an informal gathering/coffee break.
Consultation records	The stakeholder consultation was recorded in the "informe de cumplimiento del plan de relaciones comunitarias", including pictures and stakeholders present. See *"6a. informe de relaciones comunicatarias 2023.pdf".*
Stakeholder input	Last meeting, 15 – 20 persons were present, a diverse group of people from the local communities including elders, adults, teens and even children. The project was clarified, e.g. noise and emissions production, but no issues were raised that require updating the project design.

2.1.3 Free, Prior, and Informed Consent

Consent	Before implementation of the project, as part of the Environmental Impact Assessment, a stakeholder consultation (called socialization process) was performed, supported by a specialized facilitator Soc. **Arevalo Jaime Ayala, (see Informe de facilitación, proceso de consulta y participacíon social, "*6. Stakeholder consultation report 2013.pdf*")** following all legal obligations related to such stakeholder consultations (i.e. Article 14, 95 96, 97 and 398 of the Constitution of the Republic of Ecuador; and Book VI of Environmental Quality Unified Text of Secondary Environmental Legislation (TULAS), Chapter 3, Article 20 on social participation). These rules give the legal structure to guarantee free, prior and informed consent. Any decision or government approval that may affect the environment requires prior consultation of the community. The stakeholder consultation process, as carried out prior to the project implementation has been approved as part of the EIA.

Outcome of FPIC	During the initial stakeholder consultation, performed prior (in 2013) to implementation of the project (in 2017) as part of the Environmental Impact Assessment, no signs of conflict or opposition to the project were noticed. See "*6. Stakeholder consultation report 2013.pdf*". The positive responses from the stakeholder process did not raise the need to update the project design. Please note that already in 2011, prior to the plans to develop LFG extraction, a Social Responsibility Agreement for Co-management of the new Cuenca Landfill has been established. This agreement establishes among others that Sant Ana parish and communities will benefit from an Environmental Services Fund (5% of the amounts received by the landfill) and prevention of environmental pollution, protection of health and safety. No specific additional agreement was made for implementation of the LFG project. The Pichacay landfill site has been established in 2011. The project (implemented in 2017) is 100% located at the site of the Pichacay landfill. Therefore, the project has not encroached on land, relocated people without consent, nor committed forced physical or economic displacement. Also during the last yearly stakeholder consultation and site visit of November 2023, no ongoing or unresolved conflicts were identified.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
NA	EMAC and BGP-EMAC have an open-door policy, making it easy for stakeholders to communicate grievances about the project. Any complaint or suggestion can be directly delivered to the project administration through "Suggestion boxes" located at the landfill administration office and the power plant operation office. In Ecuador, the "Technical Standard for Handling Questions, Complaints, Suggestions, Information Requests, and

	Commendations" (See *"42. Documento_Norma Preguntas quejas y sugerencias.pdf")* establishes a standardized procedure for public entities to address user concerns in a timely and well-motivated manner. This standard outlines the process for submission and response to grievances, ensuring transparency and accountability. EBE follows the procedure suggested in the standard to handle formal complaints. The main steps are summarized below: 1. Submission of a Complaint: • Stakeholders may submit formal complaints through written communication, email, or the company's designated grievance mechanisms, which may include suggestion boxes where applicable. • Complaints must clearly describe the issue, relevant dates, and supporting documentation if available. 2. EBE's Response Process: • Complaints are received and logged by the designated officer. • An initial review is conducted within a timeframe specified in the Technical Standard to assess validity and complexity. • If necessary, an internal investigation is carried out to gather further details. • A resolution proposal is formulated and communicated to the complainant. • If the complainant is unsatisfied, an escalation process is available for further review.

2.1.5 Public Comments

Summary of comments received	Actions taken
No public comments were received	Subsequently, no actions were taken or any project design updates performed.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management experience

EBE is in operation already since 2017. David Conzalez has already worked 10 years for EBE, since its startup phase, of which the last 5 years as managing director, as stated in *"31 David Gonzalez Director project EBE 13 May 2019.pdf"*. He successfully manages the project in all its facets, including stakeholder engagement. To support the project proponent, since the start of the VCS-project, Martijn Vis of BTG Biomass Technology Group BV is involved as carbon consultant of the project, taking care of the project documentation, and managing the registration, and subsequent monitoring and verification processes. BTG has been developing emission reduction projects since 1998[7]. Martijn Vis, senior consultant, has experience with carbon projects since 2004, including management of a portfolio of bioheat boilers in the Czech Republic (Joint Implementation) and in Brazil (CDM), and advisory services for VCS projects.

2.2.2 Risk assessment

	Risk identified	Mitigation or preventative measure taken
Natural and human-induced risks to stakeholders' wellbeing	Neighboring communities could suffer from health risks, if polluting emissions or events like fire are not prevented. Site visitors need to be protected from possible injury and health risks.	The Environmental management plan (see *7. Environmental management plan 2019.pdf*) has an impacts prevention and management plan (measures 1.1.1 to 1.1.20), a contingency plan (1.2.1 to 1.2.9), a training plan (1.3.1 to 1.3.3), an occupational health and safety program (1.4.1 to 1.4.9), a community relations plan (1.6.1 to 1.6.8), a rehabilitation plan for affected areas (1.7.1 to 1.7.7) all meant to prevent and reduce natural and human induced risks to stakeholders' wellbeing.
Risks to stakeholder participation	Insufficient stakeholder communication and participation; visitors	The environmental management plan (See *7. Environmental management plan 2019.pdf*) includes a community relations plan, establishing a system of registration,

[7] See https://www.btgworld.com/en/services/diensten-consultancy/

	unaware of dangers on site.	control and monitoring of requirements from social actors, which will be considered to improve the social and environmental management of the project (measure 1.6.1). The company will carry out a program of informative workshops for the community regarding project activities and environmental issues (1.6.2). This includes the yearly stakeholders site visit & discussion event. Prior to the project activities the permission of landowners was obtained (1.6.3). The *training plan* contains semi-annual information and dissemination program to the communities in its area of influence about the project activities and environmental measures implemented for the prevention and mitigation of impacts (measure 1.3.9). Visitors obtain health and safety instructions before entering the project facilities (1.3.1).
Working conditions	Moving vehicles on the project area, risk of fire, accidents, fuels, hydrocarbon and chemical spills/leaks, occupational hazard and health risks, dehydration risk.	All health and safety measures are taken following the internal labor regulation (see *"3. Reglemento interno de trabajo.pdf"*) and the integral security plan (see "*8. integral security plan.pdf*". The Environmental management plan (see *7. Environmental management plan 2019.pdf*) contains an *impact prevention and mitigation plan* with measures addressing safe driving (measures 1.1.1 and 1.1.2), a *contingency plan* with measures to take in case of fire, accidents, spills of fuels, hydrocarbons or chemicals (see measures 1.2.1-1.2.5), a *training plan* with preventive measures avoiding of and dealing with fire, accidents and health risks (measures 1.3.1 to 1.3.3, 1.3.5, 1.3.6), and an *occupational health and safety plan* with measures to safeguard the integrity of the

		workers involved in the project activities, e.g. compliance with worker health and safety regulations (1.4.3), provision of personal protection elements and clothing (1.4.4), coordination of medical care (1.4.5), accident investigations (1.4.6), provision of water to workers (1.4.7), fire-fighting systems, 1.4.8), safety signage (1.4.9), storage meeting the provision of the fire prevention and protection regulation (1.4.10), vehicles and machinery having an emergency response kit (1.4.11), and inspections of storage areas (1.4.12),
Safety of women and girls	No risk identified	Two women are working for EBE, one in administration and one on site. EBE took care of separate toilets and dressing rooms. See the maps and pictures in *"9. separate toilets and dressing rooms.pdf"*
Safety of minority and marginalized groups, including children	No risk identified	All workers get the same safety training as determined in the *"3. Reglemento interno de trabajo.pdf"* (internal labor regulation) of EBE. Child labor is not allowed by law, as stated in the Codificación 17 Registro Oficial Suplemento 167 de 16-dic.-2005 (labor law) (see "*10. Codigo del trabajo.pdf")* that is directly applicable to EBE.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	There is a risk of pollutants (air, noise, water, waste generation, and release of hazardous materials)	The environmental management plan (see *7. Environmental management plan 2019.pdf*) contains an *impact prevention and mitigation plan* with measures to protect watercourses (measure 1.1.3), fuel management inspections (1.1.4), use of MSDS (1.1.5), correct storage of chemicals (1.1.6), adequate preventive and corrective maintenance of machinery (1.1.7), maintenance of oil-water separators (1.1.10), and several measures to protect water and soil during formation of facilities and infrastructure

		(1.1.13 to 1.1.20). The *contingency plan* contains measures to address possible environmental emergency situations that could lead to discharge of pollutants (1.2.1-1.2.9). The *training plan* has communication measures preventing pollution, the burning of vegetation and incineration of any matter, and with emergency responses (1.3.1-1.3.6). The *occupational health and safety plan* has measures to ensure proper management of fuels i.e. storage meeting the provision of the fire prevention and protection regulation (1.4.10), vehicles and machinery having an emergency response kit (1.4.11), and inspections of storage areas (1.4.12). The *waste management plan* contains several measures for proper waste management by amongst others, segregation between hazardous and non-hazardous waste (1.5.1), prevention and minimizing waste generation (measure 1.5.2), proper record keeping, storage, delivery and disposal (1.5.3 - 1.5.8). Care is taken that various waste types are treated properly (1.5.9 – 1.5.12). See also ”Declaratión anual de desechos peligrosos – año 2023” (See *“11. Hazardous waste disposal.pdf”*). The *rehabilitation plan for affected areas* requires removal and/or remediation of contaminated soil (if any) and proper disposal of the remediated soil (if any) (1.7.5 - 1.7.7). The *monitoring and follow-up plan* requires the company to self-monitor combustion emissions and noise from fixed sources (1.9.3 and 1.9.4), impacts of fuel management on soil (1.9.5), non-ionizing radiation and magnetic fields of the transmission lines (1.9.6), rehabilitated intervened areas

		(1.9.7) and to carry out site inspections (1.9.8).

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	EBE does not allow discrimination and no signals have been received that this takes place. The *"3. Reglemento interno de trabajo.pdf"* (the internal labour regulations of EBE) has a specific title *"determination, attention and sanctions in cases of discrimination or harassment"* describing in detail the internal policies against discrimination (see articles 5, 8, 35-38, and 40 of this document).
Sexual harassment	No risk identified	EBE does not allow sexual harassment, and no signals have been received that this takes place. The "*3. Reglemento interno de trabajo.pdf*" (the internal labour regulations of EBE) has a specific title *"determination, attention and sanctions in cases of discrimination or harassment"* describing in detail the internal policies against sexual harassment (see articles 5, 8, 35-38, and 40 of this document).
Gender equity in labor and work	No risk identified	Equal opportunities are provided in the context of gender equity and pay for labor and work. EBE has employed mainly men, but also some women and a transperson. The *"3. Reglemento interno de trabajo.pdf"* article 5 describes that in the selection of workers it is prohibited by the employer for workers to as applicants about pregnancy tests and/or results, marital status, or select regarding age, sex, ethnicity, gender identity, etc.
Forced labor	No risk identified	Forced labor is not allowed by law, as stated in the *"10. Codigo del trabajo.pdf"*, Codificación 17

		Registro Oficial Suplemento 167 de 16-dic.-2005 (labor law) that is directly applicable to EBE.
Child labor	No risk identified	Child labor is not allowed by law, as stated in the "10.Codigo del trabajo.pdf", Codificación 17 Registro Oficial Suplemento 167 de 16-dic.-2005 (labor law) that is directly applicable to EBE.
Human trafficking	No risk identified	Regarding human trafficking, EBE follows the internal policy of joint venture partner EMAC that non-qualified labor is hired within the Parish of St Ana, the area where the plant is located.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	EMAC-BGP operates in Ecuador, as a 50% state owned company, and respects all laws and regulations of Ecuador, including the United Nations Declaration on the Rights of Indigenous Peoples and ILO Convention 169 on Indigenous and Tribal Peoples, that were all ratified by Ecuador[8]. Joint venture partner EMAC publishes sustainability reports, which can be found on https://emac.gob.ec/memoria-de-sostenibilidad/.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified.	The project has no specific impact on indigenous peoples and cultural heritage. Local employed staff may have a local traditional background. The work at EBE does not specifically prevent or promote their personal life and traditions.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	Ownership and property rights are all respected and documented. EMAC is the legal owner of the landfill site, as documented in *"12. El salado Sta Ana.pdf", "13. Pichacay Sr. Ambrosi 98.56 HCTS0001.pdf"* and "14. *Relleno Sanitario Pichacay 25.02 HCT.0001.pdf"*

[8] https://digitallibrary.un.org/record/609197?ln=en

	The project proponent EBE has the legal right to use the property, e.g. the landfill site, for LFG extraction and energy generation as established in the *"Escritura Pública de comadato otorgado por: Empresa publica municipal de aseo de Cuenca EMAC EP a favor de Companñia mixta EMAC-BGP Energy CEM Cuantía: inderterminada"*. See *"2. EBE Commodate.pdf"*

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	The project does not impact property rights; however, it still has benefit sharing agreements. The landfill owner EMAC has a benefit sharing agreement, established as the Social Responsibility Agreement for Co-management of the new Landfill (Established on 27-May-2001 (See ***"32. Social responsibility agreement EMAC 27 May 2001.pdf";*** its addendum on 15-December-2011 (See ***"33. Social responsibility agreement EMAC – addendum 15 Dec 2011.pdf";*** and the second version of 23-June-2016 (see "***34. Social responsibility agreement EMAC -2****nd* ***version 23 June 2016.pdf"***). In this agreement it is established, among others, that Parish Santana and its communities will be beneficiaries of an Environmental Services Fund, which represents 5% of the amounts collected for the concept of the public cleaning fee and garbage collection. It also means that the communities can manage their development in topics such as economic reactivation, health and sanitation, infrastructure; environmental management, etc. EBE follows the state law named Contribution to Local Development Projects, which states that, yearly, 12 % of the net utility of the company needs to be reserved for the local community.

Benefit sharing during the monitoring period	The benefit sharing program of EMAC has been implemented. The parish of Santa Ana determines which projects benefit from the program. The benefit sharing arrangement of EBE did not result in concrete projects yet, but the money is kept aside as required by law.

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measure taken during the monitoring period
Impacts on biodiversity and ecosystems	The formation of the facilities and infrastructure and the operation of the plant could have a local impact on biodiversity and ecosystems.	The Environmental management plan (See "7. *Environmental management plan 2019.pdf*" contains several measures to prevent and mitigate impacts on biodiversity and ecosystems. The *Impact prevention and mitigation plan* (§1.2 of the Environmental management plan) stipulates that); clearing activities take place manually only within the area of use (measure 1.1.8); cleared vegetation will be chipped and located in areas surrounding the intervention sites (1.1.9); plant material resulting from maintenance will not interrupt channels and bodies of surface water (1.1.11); no use of herbicides, and manual maintenance of the vegetation (1.1.12); animals are not killed but collected and relocated to surrounding areas (1.1.13). In facility and infrastructure development, surrounding slopes will be protected (1.1.14); .During project development, the company will minimize the impact on soil, by using existing roads and rails where possible, and by planning infrastructure optimally to avoid erosion (not on slopes). (See 1.1.15 to 1.1.17). In case soil has to be removed in the formation of facilities and/or infrastructure

		for the project, it has to be stored properly and used for rehabilitation of the soil after the project does not need the facilities and infrastructure anymore (1.1.18). After the intervention, uncontrolled soil erosion has to be prevented by measures such as coronation ditches, gradient switches, sediment barriers and slope stabilization (1.1.19). The use and disposal of dielectric insulation liquids is forbidden (1.1.20) The Environmental management plan also contains a *Contingency plan (§1.2)* to respond to environmental emergencies such as fire, transport accidents with dangerous materials, and hydrocarbon spills/leaks (see measures 1.2.1 – 1.2.7). The company has a contingency kit to respond to emergencies due to hydrocarbon spills/leaks, and these spills/leads will be removed (1.2.8 - 1.2.9). The Environmental management plan contains a *Training plan (§ 1.3)* containing measures such as prohibition of collection of flora species for commercial purposes, introduction of exotic species, burning of vegetation or any matter, capture and intentional harassment of wildlife (measures 1.3.4). Quarterly updates on environmental topics (1.3.5), training on emergency response (1.3.6) will be organized. Moreover, the company prohibits hunting and fishing activities towards its workers (measure 1.3.8) *The Rehabilitation plan for affected areas* (§1.7 of the Environmental management plan) takes care that material obtained from the removal of soil in the formation of facilities/infrastructure for the project activities are stored properly and used in the subsequent process of rehabilitation of the area (measure 1.7.1). Once the intervened areas are no longer required for project

		activities its environmental rehabilitation will proceed (1.7.2), by revegetation (1.7.3), using native species (1.7.4). Soil contaminated with hydrocarbons/chemicals (if any) is removed, and compacted soil is de-compacted, once the project activity has finished (1.7.5). The *Monitoring and follow-up plan*, §1.9 of the Environmental management plan, describes that the company will monitor the rehabilitated intervened areas to verify the effectiveness of the actions taken (measure 1.9.7). The company will carry out inspections of operational and abandoned areas covering at least the following elements: perimeter ditches, coronation ditches, slopes, sites with erosion, existence of waste, equipment, internal vegetation and state of surrounding vegetation (1.9.8)
Soil degradation and soil erosion	Soil can be degraded by the construction of facilities and/or infrastructure needed for the project, or by improper handling of generated solid waste	The environmental management plan (See *"7. Environmental management plan 2019.pdf"*) contains several measures to prevent and mitigate soil degradation and soil erosion. The Impact prevention and mitigation plan (§ 1.2 of the Environmental action plan) ensures that legal provisions for fuel management are followed, i.e. waterproofed and roofed buckets ensuring the containment of a volume of at least 110% of the largest capacity tank (measure 1.1.4). Chemicals are handled and stored according to their MSDS Material Safety Sheets (1.1.5 - 1.1.6). Equipment, machinery and vehicles must be maintained properly to avoid among others oil leaks (1.1.7). In facility and infrastructure development, surrounding slopes will be protected (1.1.14). During project development, the company will minimize the impact on soil, by using existing roads and rails where possible, and by

		planning infrastructure optimally to avoid erosion (not on slopes). (1.1.15 to 1.1.17). In case soil has to be removed in the formation of facilities and/or infrastructure for the project, it has to be stored properly and used for rehabilitation of the soil after the project does not need the facilities and infrastructure anymore (1.1.18). After the intervention, uncontrolled soil erosion has to be prevented by measures such as coronation ditches, gradient switches, sediment barriers and slope stabilization (1.1.19). The use and disposal of dielectric insulation liquids is forbidden (1.1.20) The Environmental management plan also contains a *Contingency plan (§1.2)* to respond to environmental emergencies such as fire, transport accidents with dangerous materials, and hydrocarbon spills/leaks (see measures 1.2.1 – 1.2.7). The company has a contingency kit to respond to emergencies due to hydrocarbon spills/leaks, and these spills/leads will be removed (1.2.8 to 1.2.9). The Environmental management plan contains a *Training plan (§ 1.3)* requiring quarterly updates on environmental topics (measure 1.3.5) and the organization of training on emergency response (1.3.6). The Environmental management plan contains an *Occupational health and safety plan (§1.4)* taking care that the fuel storage area will comply with fire prevention and protection regulations, and that an emergency response kit for hydrocarbon spills is available (measure 1.4.10). Vehicles and machinery will have an emergency response kit for hydrocarbon spills and a portable fire extinguisher (1.4.11). Also regular inspections of the fuel oil, and grease storage area to verify on tank integrity, corrosion leaks etc. are held (1.4.12).

		The *Waste management plan* (§ 1.5 of the Environmental management plan) contains several measures for proper waste management by amongst others, segregation between hazardous and non-hazardous waste (measure 1.5.1), prevention and minimizing waste generation (measure 1.5.2), proper record keeping, storage, delivery and disposal (1.5.3 - 1.5.7). Care is taken that debris for construction (1.5.9) and industrial effluents (1.5.11) are handled and treated properly. Also, actions are carried out to minimize the generation of waste (1.5.12). *The Rehabilitation plan for affected areas* (§1.7 of the Environmental management plan) takes care that material obtained from the removal of soil in the formation of facilities/infrastructure for the project activities are stored properly and used in the subsequent process of rehabilitation of the area (measure 1.7.1). Once the intervened areas are no longer required for project activities its environmental rehabilitation will proceed (1.7.2), by revegetation (1.7.3), using native species (1.7.4). Soil contaminated with hydrocarbons/chemicals (if any) is removed, and compacted soil is de-compacted, once the project activity has finished (1.7.5). If contamination of soil is detected, remediation services will be carried out in the affected area (1.7.6) and the remediated soil will be disposed of outside the project or delivered to a company with an environmental license for final disposal (1.7.7) The *Area abandonment and delivery plan* (§ 1.8 of the Environmental management plan) takes car that in case of definite closure of the project, the company will ensure the non-existence of environmental liabilities through laboratory test of the water and soil

		components (measure 1.8.1), the environmental liabilities report will be sent to the environmental control authority (1.8.2), and leave the location of its facilities as it was initially found (1.8.3 to 1.8.4). The *Monitoring and follow up plan*, §1.9 of the Environmental management plan, describes that the company will self-monitor the soil on the outside of the area where fuels, oil and greases are stored (measure 1.9.5) and monitor the rehabilitated intervened areas to verify the effectiveness of the actions taken (1.9.7). The company will carry out inspections of operational and abandoned areas covering at least the following elements: perimeter ditches, coronation ditches, slopes, sites with erosion, existence of waste, equipment, internal vegetation and state of surrounding vegetation (1.9.8).
Water consumption and stress	Risk of water pollution by spills of chemicals and fuels, or improper management of liquid waste. Risk of disturbance water bodies during construction.	The environmental management plan (See *"7. Environmental management plan 2019.pdf"*) contains several measures to prevent and mitigate water consumption and stress. The impact prevention and mitigation plan (§ 1.1 of the *"Environmental management plan.pdf"* states that in the activities of forming facilities/infrastructures of the project, temporary / permanent water courses will be protected, avoiding interrupting their channel with residues or vegetation or removed material (measure 1.1.3). Legal provisions for fuel management are followed, i.e. waterproofed and roofed buckets that ensure the containment of a volume of at least 110% of the largest capacity tank (1.1.4). Chemicals are handled and stored according to their MSDS Material Safety Sheets (1.1.5 - 1.1.6). Equipment, machinery and vehicles must be maintained

		properly to avoid among others oil leaks (1.1.7). Oil-water separators in power plants receive periodic maintenance and inspection (1.1.10). Plant material resulting from maintenance will not interrupt channels and bodies of surface water (1.1.11). During project development, the company will minimize the impact on water, by using existing roads and rails where possible, and by planning infrastructure optimally to avoid erosion (not on slopes) (1.1.15 to 1.1.17). The use and disposal of dielectric insulation liquids is forbidden (1.1.20). The Environmental management plan contains a *Contingency plan (§1.2)* to respond to environmental emergencies such as fire, transport accidents with dangerous materials, and hydrocarbon spills/leaks (see measures 1.2.1 – 1.2.7). The company has a contingency kit to respond to emergencies due to hydrocarbon spills/leaks, and these spills/leads will be removed (1.2.8 - 1.2.9). The Environmental management plan contains a *Training plan (§ 1.3)* requiring quarterly updates on environmental topics (measure 1.3.5) and the organization of training on emergency response (1.3.6). The Environmental management plan contains an *Occupational health and safety plan (§1.4)* taking care that the fuel storage area will comply with fire prevention and protection regulations, and that an emergency response kit for hydrocarbon spills is available (measure 1.4.10). Vehicles and machinery will have an emergency response kit for hydrocarbon spills and a portable fire extinguisher (1.4.11). Also regular inspections of the fuel oil, and grease storage area to verify on tank integrity, corrosion leaks etc. are held (1.4.12).

		The Waste management plan (§ 1.5 of the Environmental management plan) contains several measures for proper waste management by amongst others, segregation between hazardous and non-hazardous waste (measure 1.5.1), prevention ana minimizing waste generation (1.5.2), proper record keeping, storage, delivery and disposal (1.5.3 - 1.5.7). Care is taken that organic waste (1.5.8), debris for construction (1.5.9), waste from bathrooms for the use of bathrooms (1.5.10), and industrial effluents (1.5.11) are handled and treated properly. Also actions are carried out to minimize the generation of waste (1.5.12).

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	**The Environmental Impact Assessment (*See"5. EIA.pdf"*) includes an inventory of wildlife (birds, reptiles, amphibians, mammals). 15 bird species were observed of which 5 regarded rare (Falco sparverius, lesbia nuna, Southern Yellow grosbea, blue-gray tanager, and Tyto alba), Two amphibian species were identified (gastrotheca pseutstes and Pristimantis sp) and one reptile (stenocercus festae). The 4 found mammals are all very common** (Didelphis marsupialis, Histiotus montanus, Mus musculus and Rattus norvegicus)**.**
Areas needed for habitat connectivity	*N/A*

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	Access to clean water is essential for identified rare species.	The EIA (see *"5. EIA.pdf"*) concludes that the amphibians and reptiles are most vulnerable and need clean water. Also, for the birds access to water is essential. Therefore, the Environmental Management plan contains several measures to protect the available water sources. See especially

		the measures listed in *"7. Environmental Management Plan.pdf"* as elaborated in the previous table under "water consumption and stress", as well as the listed measures to avoid impacts on biodiversity, soil degradation and soil erosion.
Areas for habitat connectivity	No risk identified	The environmental management plan (See Table 1.7-1 of "7. *Environmental management plan 2019.pdf*") includes a rehabilitation plan for affected areas with a register of intervened areas foreseeing in environmental rehabilitation once an intervened area (roads, tracks, trails, logistical support areas, slopes, etc.) are no longer required for project activities.

2.4.2 Introduction of species

N/A– no species are introduced.

Species introduced	Classification	Justification for use	Adverse effects and mitigation
N/A	N/A	N/A	N/A

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
N/A	N/A

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	No risk identified	As documented in the Environmental impact assessment (See "*5. EIA.pdf*" chapter 10), no invasive species were identified. Following the environmental management plan (See "7. Environmental management plan 2019.pdf" (measure 1.3.4) the

		introduction of exotic species is prohibited.

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	The project did not lead to ecosystem conversion. As described in the EIA (see *"5. EIA.pdf"*, section 2.1) the landfill opened in October 2001 by EMAC, which is more than 15 years prior to the introduction of the project activities by project proponent EBE, i.e., landfill gas extraction and renewable energy generation by project proponent EBE in 2017.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Two of the four 0.85 MW engine-generators initially envisaged, have been installed, and were operational at the start of 2023. Between 14 March 2023 and 23 March 2023 there has been a maintenance period, in which with both engines-generators did not produce electricity. On 09-May-2023 the second engine-generator was severely damaged. The temperature in one of the cylinders of engines went up very fast, possibly caused by a lack of lubrication, until the piston melted to the cylinder, and exploded, making a big hole in the engine block, destroying amongst others the turbo. As a result, engine-generator 2 has not been operational between 10-May-2023 and 31-December-2023. Retake of electricity production with the second engine-generator is expected from March 2024 onwards. Because of the incident, between 10-May-2023 and 04-June-2023 both engine-generators did not produce electricity were not operational. From 05-June-2023 on, engine-generator 1 was again operational.

The installation of engine-generator set 3 is planned to occur in the year 2026, provided that the project is able to increase the landfill gas yield in 2024. The investment decision for engine-generator 3 will be taken in 2025. The date of installation of Engine-generator set 4 has not been confirmed yet. Engine-generator sets 3 and 4 are not part of the monitoring period 01-January-2023 to 31-December-2023.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviations have been applied.

3.2.2 Project Description Deviations

No project description deviations have been applied.

3.3 Grouped Projects

The project is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	η_{PJ}
Data unit	%
Description	Efficiency of the LFG capture system that will be installed in the project activity. It is used for ex ante estimation of emission reduction only. The applicable default value is selected.
Source of data	-
Value applied	50%
Justification of choice of data or description of measurement methods and procedures applied	A default value is selected.
Purpose of Data	Ex ante estimates of baseline emissions
Comments	

Data / Parameter	$\varphi_{default}$
Data unit	-
Description	Default value for the model correction factor to account for model uncertainties
Source of data	-
Value applied	0.75
Justification of choice of data or description of measurement methods and procedures applied	Option 1 of the CDM methodological tool Tool04 is selected, Therefore, a default value for $\varphi_{default}$ is used. For baseline emissions: refer to the table below to identify the appropriate factor based on the application of the tool (A or B) and the climate where the SWDS is located. **Default values for the model correction factor** **Humid/wet conditions** | **Dry conditions** Application A | 0.75 | 0.75 Application B | 0.85 | 0.80

	As application A is applicable, 0.75 is the value to be applied.
Purpose of Data	Ex ante estimates of baseline emissions
Comments	

Data / Parameter	f_y
Data unit	-
Description	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.
Source of data	-
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	As this is already accounted for in $F_{CH4,BL,y}$, "f" in the tool is assigned a value of 0
Purpose of Data	Ex ante estimates of baseline emissions
Comments	

Data / Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global Warming Potential of methane
Source of data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Global warming potential of methane valid for the relevant commitment period (GWP values from AR5).
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	OX
Data 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 applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline emissions
Comments	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

Data / Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Ex ante estimates of baseline emissions
Comments	Upon biodegradation, organic material is converted to a mixture of methane and carbon dioxide.

Data / Parameter	$DOC_{f,default}$
Data unit	Weight fraction
Description	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	In case of ex ante estimation of emissions (Application A) following Tool 04 paragraph 4) a default value of DOC_f can be used. $DOC_{f,y} = DOC_{f, default} = 0.5$
Purpose of Data	Ex ante calculation of baseline emissions
Comments	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can only be used for Application A or Application B if the tool is applied to MSW.

Data / Parameter	$MCF_{default}$
Data unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied	1.0
Justification of choice of data or description of measurement methods and procedures applied	In case that the SWDS does not have a water table above the bottom of the SWDS and in case of application A, then select the applicable value from the following: (a) 1.0 for anaerobic managed solid waste disposal sites. These must have 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 will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) levelling of the waste; (b) 0.5 for semi-aerobic managed solid waste disposal sites. These must have controlled placement of waste and will include all of the following structures for introducing air to the waste layers: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system; (c) 0.8 for unmanaged solid waste disposal sites – deep. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters;

	(d) 0.4 for unmanaged-shallow solid waste disposal sites or stockpiles that are considered SWDS. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than five meters. This includes stockpiles of solid waste that are considered SWDS (according to the definition given for a SWDS) Application A is applicable. The landfill of Pichacay is an anaerobic managed solid waste disposal site, as described under (a).
Purpose of Data	Ex ante estimates of baseline emissions
Comments	

Data / Parameter	$W_{j,x}$
Data unit	T
Description	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x
Source of data	Several sources: EMAC-EP (2016) Caracterización de los residues sólidos generatos en el Cantón Cuenca, año 2015, informe preparado para la empresa pública municipal de aseo de Cuenca, enero de 2016; estimations from Ing Paul Crespo, head of the final disposal department of EMAC-EP, Hendrik Velthuis BGP Engineering B.V. See section 3.4 of the *Joint Project description & monitoring report PICHACAY LANDFILL GAS RENEWABLE ENERGY PROJECT, version 3.2 of 7-July-2019* under *Determination of Wj,x* including Table 1 to Table 4.
Value applied	See Table 5 (p 33) of the *Joint Project description & monitoring report PICHACAY LANDFILL GAS RENEWABLE ENERGY PROJECT, version 3.2 of 7-July-2019*
Justification of choice of data or description of measurement methods and procedures applied	The characterization of solid waste in Cuenca has been done for three decades. EMAC-EP (2016) is the most recent update and includes historical data on waste composition. More info is provided in section 3.4 of the *Joint Project description & monitoring report PICHACAY LANDFILL GAS RENEWABLE ENERGY PROJECT, version 3.2 of 7-July-2019*.
Purpose of Data	Ex ante estimates of baseline emissions
Comments	The time period in which waste is disposed at the SWDS is from 2001 on. Therefore, x=1 corresponds with the year 2001.

Data / Parameter	DOC_j
Data unit	Weight fraction
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 applied	For MSW, the following values for the different waste types j should be applied: **Default values for 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
Justification of choice of data or description of measurement methods and procedures applied	The default values are applied.
Purpose of Data	Ex ante estimates of baseline emissions
Comments	The procedure for the ignition loss test is described in BS EN 15169:2007 Characterization of waste. Determination of loss on ignition in waste, sludge and sediments. The percentages listed in table above are based on wet waste basis which are concentrations in the waste as it is delivered to the SWDS. The IPCC Guidelines also specify DOC values on a dry waste basis, which are the concentrations after complete removal of all moist from the waste, which is not believed practical for this situation

<table>
<tr><td>Data / Parameter</td><td>k_j</td></tr>
<tr><td>Data unit</td><td>1/yr</td></tr>
<tr><td>Description</td><td>Decay rate for the waste type j</td></tr>
<tr><td>Source of data</td><td>IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)</td></tr>
<tr><td>Value applied</td><td>
<table>
<tr><td></td><td>Waste type j</td><td>Value for boreal and temperature (MAT≤20°C). Dry (MAP/PET<1)</td></tr>
<tr><td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.04</td></tr>
<tr><td>Wood, wood products and straw</td><td>0.02</td></tr>
<tr><td>Moderately degrading</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.05</td></tr>
<tr><td>Rapidly degrading</td><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.06</td></tr>
</table>
</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>MAT = 14.7° C. Therefore, the values belonging to a boreal and temperature (MAT≤20°C) should be applied
Source: Sistema de Clasificación Bioclimática Mundial (temperatures) and: Cuenca Climate Guide, meaning that Cuenca has a boreal and temperate climate.
MAP = 878 mm/year (source: https://www.weather-atlas.com/en/ecuador/cuenca-climate#rainfall)
PET = 1189 mm/year (source: data from weather station Cuenca-Ricauerte obtained from FAO Climwat, processed in FAO Eto calculator. ETo represents the evapotranspiration rate from a reference surface, not short of water. The ETo calculator assesses ETo from meteorological data by means of the FAO Penman-</td></tr>
</table>

	Monteith equation. See http://www.fao.org/land-water/databases-and-software/eto-calculator/en/ and MAP/PET < 1, so values for dry climate are taken
Purpose of Data	Ex ante estimates of baseline emissions
Comments	MAT = Mean Annual Temperature MAP = Mean Annual Precipitation PET = Potential evapotranspiration.

Data / Parameter	$F_{CH4,BL,y}$
Data unit	t CH_4
Description	Methane emissions that would be captured and destroyed to comply with national or local safety requirement or legal regulations in the year y (t CH4).
Source of data	-
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	In Ecuador there is no law that requires to destroy methane. Before the project no existing LFG capture and destruction system was in place. Hence $F_{CH4,BL,y}$ as per table 3 of ACM0001 "Flaring or use of landfill gas" Case 1 is applicable. In this situation $F_{CH4,BL,y}$=0.
Purpose of Data	Calculation of baseline emissions
Comments	Applicable guidance and procedures from the CDM baseline and monitoring methodology ACM0001 – "Flaring or use of landfill gas" may be followed, as well as taking into account the compliance with the relevant local laws and regulation if such laws and regulations exist

Data / Parameter	$EF_{grid,y}$
Data unit	tCO_2e/MWh
Description	CO_2 emission factor of the grid electricity in year y
Source of data	CENACE (2017), 2017 report, CO_2 emission factor of the National Interconnected System, determined by the Technical Commission for Determination of Greenhouse Gas Emission Factors. See the Joint Project Description and Monitoring Report of the Pichacay Landfill Gas Renewable Energy Project, version 3.2 of 7-July-2019.
Value applied	0.3349

Justification of choice of data or description of measurement methods and procedures applied	Combined margin CO_2 emission factor for grid connected power generation in year y was calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (Tool07). For the determination of OM and BM it was chosen to determine these factors ex ante for the whole duration of the first crediting period.
Purpose of Data	Calculation of baseline emissions Calculation of project emissions
Comments	The calculation of $EF_{grid,y}$ using the "Tool to calculate the emission factor for an electricity system" is described in further detail in the Joint Project Description and Monitoring Report of the Pichacay Landfill Gas Renewable Energy Project, version 3.2 of 7-July-2019.

Data / Parameter	$TDL_{j,y}$
Data unit	Fraction
Description	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data	CENTROSUR, the electricity distribution company that owns and manages the electric grid
Value applied	5.76%
Justification of choice of data or description of measurement methods and procedures applied	Scenario A of TOOL 05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" applies. The annual average value based on the most recent data available within the host country was chosen. (See TOOL05, version 03.0, Data / Parameter table 3)
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	$EG_{PJ,facility,2017-2018}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in 2017-2018
Source of data	Electricity meters (ION 7650)
Value applied	2017: 2,776 2018: 5,165

Justification of choice of data or description of measurement methods and procedures applied	Since this is a retroactive project, it is possible to apply measured data for the ex-ante determination of the emission reduction from grid displacement electricity.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EG_{PJ,facility,2019-2027,estimated}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Estimation from project owner
Value applied	2019: 9,690 2020: 12,920 2021: 12,920 2022: 25,840 2023: 25,840 2024: 25,840 2025: 25,840 2026: 25,840 1-January-2027 to 26-July-2027: 14,654
Justification of choice of data or description of measurement methods and procedures applied	The project consists of 4 engine-generators (units) that convert landfill gas into electricity. Unit 1 started commercial operation on 27-July-2017; Unit 2 started commercial operation on 1-October-2021; engine 3 is expected to start in the last trimester or the first semester of 2023; the installation of Engine 4 has not been planned yet; and are not part of the monitoring period 1 Jan 2019 – 31 Dec 2020. Each engine has a capacity of 1 MW and is expected to generate 0.85 MWh/h during 7,600 hours per year, i.e. 6,460 MWh/engine/year, and 25,840 MWh/year for all 4 engines together. For 2027, a fraction of 207/365 is applied, based on the number of calendar days from 1-January-to 26 July.
Purpose of Data	Ex ante calculation of baseline emissions
Comments	-

Data / Parameter	NCV_{CH4}
Data unit	MJ/Nm^3
Description	NCV of methane
Source of data	-
Value applied	35.9
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	D_{CH4}
Data unit	t CH_4/Nm^3 CH_4
Description	Density of methane at the temperature and pressure of the landfill gas in year y
Source of data	ACM0001 version 11
Value applied	0.0007168
Justification of choice of data or description of measurement methods and procedures applied	Because the NCV of methane is reported at normal conditions, the density of methane is also determined at normal conditions. In ACM0001 (version 18.1) reference conditions are defined as 0°C (273.15 K) and 1 atm (101.325 kN/m2, 101.325 kPa). According to ACM0001 (version 11.0) at standard temperature and pressure (0 degree Celsius and 1.013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4)
Purpose of Data	Calculation of baseline emissions
Comments	AMS-III.G, TOOL04, nor ACM0001 (version 18) provide info on the density of methane under normal conditions. Therefore, a value found in the CDM baseline and monitoring methodology ACM0001 (version 11) was applied.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,facility}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meters (Schneider electric ION 7650 serial numbers MJ-1401A358-04 (main meter) and MJ-1310A536-04 (backup meter).
Description of measurement methods and procedures to be applied	The electricity generated and delivered to the grid is measured continuously and recorded hourly by two ION-7650 meters. The meters are connected to an automatic software – SIMEC, provided by CENACE (technical and economical administrator of the Ecuadorian Electrical System). On a daily basis, SIMEC generates a report automatically, called TPL, with the hourly energy (active, reactive) produced and delivered to the grid. The daily report is double-checked by the Technical Manager of the power plant as well as by CENACE technical specialists. Once the file is approved, it is stored on an online platform – SIMEM. The platform allows viewing and downloading of the stored files, named CON_MED_EXE_20YY-MM-DD.xls. At EBE, the Project Manager groups the data of the respective monitoring period into one excel sheet. All daily reports remain available and can be double checked by the project advisor and verification body.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	January 2023: 440.47 MWh February 2023: 438.60 MWh March 2023: 318.76 MWh April 2023: 418.02 MWh May 2023: 145.93 MWh (145.93 MWh after discount*) June 2023: 343.97 MWh (342.25 MWh after discount*) July 2023: 415.78 MWh (413.70 MWh after discount*) August 2023: 536.51 MWh (535.81 MWh after discount*) September 2023: 470.55 MWh October 2023: 424.03 MWh

	November 2023: 373.21 MWh December 2023: 322.98 MWh Total 2023: 4,648.82 MWh (4644.31 MWh after discount*) * See row "QA/QC procedures to be applied" below for more information about the discount that has been applied. See the file *"VCS ER calculation Project 1883 01JAN2023-31DEC2023.xls"* for the complete calculation. Daily files CON_MED_EXE_20YY-MM-DD.xls are also available.
Monitoring equipment	Two Schneider Electric ION7650 electricity meters, serial numbers MJ-1401A358-04 (main meter) and MJ-1310A536-04 (backup meter), ANSI C12.16 approved revenue meters; meets ANSI C12.20 class 0.2 accuracy standard. Its accuracy is 0.2% as found in the technical documentation. See "*15. Technical data sheet ION7650.pdf*"
QA/QC procedures to be applied	The two ION7650 meters are digital and therefore needs no servicing. It is tested for accuracy at the factory and remains accurate for the life of the meter. In contrast, electro-mechanical meters need mechanical adjustment before installation and periodic calibration thereafter. Calibration testing is unnecessary for digital meters (See *"16. PowerLogic ION 7550 ION7650 Verifying Accuracy Technical Note 032009.pdf"*). Digital meters require 'accuracy' testing, or verification, once after installation to ensure the meter meets required accuracy specifications. Errors observed in the field could be attributed to incorrect connections or instrument transformer ratio settings. This initial testing after installation has taken place on 5-October-2017. See "*17. Electricity export meter calibration certificate 2017.pdf*". Although not necessary from a technical viewpoint, the National Center for Energy Control – CENACE (the institution that controls and regulate the Ecuadorian Electrical Power System) has a legal obligation to perform calibration testing every two years. EBE does not have access to the biannual calibration reports, but can show: (1) the letter with the request of EBE to CENACE to perform the bi-annual calibration test of the electricity meters (Letter with reference EBE-039-23, of 20-June-2023, see "*18. Oficio Referencia EBE-039-23 - CENACE SOLICITUD PRUEBAS MEDIDORES.pdf"*); (2) the letter in which CENACE accepts the request, asks for additional information and sets a date for the calibration test,

namely 9-10 August 2023 (Letter with reference CENACE-GDT-2023-0124-O of 21-July-2023, see "*19. CENACE-GDT-2023-0124-O.pdf*");

(3) the letter in which EBE delivers the requested information and accepts the date proposed to perform the calibration test (Letter with reference EBE-040-2023, of 24-July-2023, see "*20. Oficio Referencia EBE-040-23 RESPUESTA CENACE MEDIDORES.pdf*"

(4) the invoice to prove that this calibration has taken place. (CENACE invoice No. 001-002-000003286 of 07 September 2023, see "*21. CENACE CALIBRATION BILL 2023.pdf".*

The monitoring report of 2021 contains similar documents proving that calibration took place on the 27-May-2021 namely.

(1) the letter with the request of EBE to CENACE to perform the bi-annual calibration test of the electricity meters (Letter with reference EBE-036-21, of 20-May-2021, see *"22. Oficio Referencia EBE-036-21 - CENACE SOLICITUD PRUEBAS MEDIDORES.pdf")*;

(2) the letter in which CENACE accepts the invitation and proposes the date for the calibration test, namely 27-May-2021 (Letter with reference CENACE-GDT-2021-0104-O of 26-May-2021, see *"23. CENACE-GDT-2021-0104-O.pdf"*) and

(3) the invoice to prove that this calibration has taken place. (CENACE invoice No. 001-002-000002585 of 08-June-2021, see *"24. CENACE CALIBRATION BILL 2021.pdf".*

The calibration of 2023, initially foreseen in June 2023 was delayed due to circumstances outside the sphere of influence of EBE. In 2022 the company LABENERGY was appointed as the only accredited laboratory or institution in the country to perform the calibrations of the meters on behalf of CENACE (See *"25.LEEC-2002-ENV-11_1-signed.pdf"*). However, LABENERGY did not perform, and phone calls of BGP-EBE early 2023 did not result in an appointment for calibration. The second bullet of the letter of CENACE with reference CENACE-GDT-2023-0124-O of 21-July-2023, see *"19. CENACE-GDT-2023-0124-O.pdf"*, in which CENACE accepts the invitation for calibration in 2023, confirms the non performance of LABENERGY indirectly, as it states that *"the electrical sector at the moment does not have a laboratory accredited by the SAE that satisfies the requirements established in Regulation No. ARCONEL 001/16, all wholesale participants and CENACE are informed that the Third Transitory Provision of Regulation No. ARCONEL - 001/16. Therefore, the National Electricity Operator CENACE will be the entity responsible for applying the verification and intervention procedures on*

measurement equipment of the aforementioned regulation (...)". Eventually, with a few months delay, CENACE has performed the calibration.

As additional information, the legal basis of the calibration procedure is found in Regulation No. ARCONEL 001/16" (See *26. Regulación Nro. ARCONEL-001_16.pdf)*. Article 16 states:

"The measurement equipment of the Ecuadorian Electric Sector (EES) participants will be subject to planned verifications, after their installation and initial officialization, according to an annual plan to be determined and informed by CENACE, to all SEE participants and to ARCONEL.

If the result of the verification of a measurement point is successful, the officialization of the measurement equipment will be ratified; otherwise, CENACE will inform the owner of the measurement equipment and ARCONEL about the aspects that have not been met and the scope of the required intervention, as well as the maximum period for its execution so that the owner of the measurement equipment can maintain the officialization of its measurement equipment, in the terms established in this Regulation. If at the end of this period, the owner of the measurement equipment has not complied with what was observed by CENACE, the provisions of section 16 of this Regulation will apply".

The same regulation in its section 16 says: *"In cases where an EES participant does not fulfill the provisions of this Regulation, CENACE will present a report to ARCONEL notifying about these abnormalities. ARCONEL, for its part, will apply the respective sanctions, as established in the LOSPEE (law of the public electricity service), and the corresponding Contract (Título Habilitante)".*

The regulation No. ARCONEL 001/16 does not determine precise final dates in which the calibrations are valid. It just states that participants are subject to planned verification, according to an annual plan to be determined by CENACE. If any calibration requirements are not met, CENACE will inform the participant, who has to solve the issues within a certain timeframe. In the case of the project, after the on-site verification of the project's meters, CENACE delivered the service invoice. EBE did not receive any report regarding calibration related abnormalities, nor have had any sanctions or penalties, such as suspension of payment for delivered electricity. The delay in calibration was caused by external causes, as acknowledged in the letter CENACE-GDT-2023-0124-O of 21-July-2023 (19. CENACE-GDT-2023-0124-O.pdf"). Therefore, EBE has met all legal requirements regarding calibration within the monitoring

	period. For the period 27-May-2023 to 09-August-2023, which is the time two years after the calibration of 27-May-2021 and before the calibration of 10-August-2023, conservatively a discount factor of 0.5% to the electricity generated has been applied. The discount factor is 2.5 times the energy accuracy of the electricity meters as found in page 2 of the description of the electricity meter (see "*15. Technical data sheet ION7650.pdf*").
Purpose of the data	Calculation of baseline emissions
Calculation method	Reading hourly electricity production and aggregate them for the monitoring period.
Comments	

Data / Parameter	EE_y
Data unit	%
Description	Energy Conversion Efficiency of the project equipment, i.e. Guascor Power Genset type SFGM560.
Source of data	Specification provided by the equipment manufacturer. For engine-generator 1 (model SFGM-560) see specifications provided in offer "Budget reference: *"27. OFV004932-170314-CS-SFGM560-Landfill-BGP Engineers"*. For engine-generator 2 (model SGE-56SM) see the product information sheet *"28. SGE-56M POWER RATING.pdf"*
Description of measurement methods and procedures to be applied	The specification provided by the equipment manufacturer is used as the equipment is designed specifically to utilize biogas as fuel. This is the case. If the specification provides a range of efficiency values, the highest value of the range shall be used for the calculation. The efficiency of nominal load is taken, which is the highest value.
Frequency of monitoring/recording	Once for each engine.
Value monitored	Engine-generator 1: 36.0% Engine-generator 2: 36.1% Highest value of both engines used in the monitoring calculation: 36.1%.
Monitoring equipment	-

QA/QC procedures to be applied	-
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$EC_{project,y}$
Data unit	MWh
Description	The quantity of electricity used for the operation of the installed facilities in the year y
Source of data	Monthly electricity bills of the of the local energy distribution company Empresa Elèctrica Regional Centro Sur C.A. (CENACE).
Description of measurement methods and procedures to be applied	They send a monthly bill with detailed specification of the electricity consumed, based on three periods (A: 07h00-18h00; B: 18h00-22h00; C: 22h00-07h00). The monthly electricity bills are kept and stored on paper and as a scanned pdf file. Due to new regulations, since 25-October-2019 the electricity bill is split in two bills: • Energy consumed from the grid in low voltage (220 – 110 V: auxiliary services). • Energy consumed by the genset in mid voltage (22,000 V: substation and 480 V equipment). In case the monthly bills from CENACE are not made available, alternative bills will be downloaded from the *Internal Rent Service of Ecuador (SRI)* system, These alternative bills only contain the costs in USD, but since the tariffs for each period are known, the amount of consumed can be calculated.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value monitored	155.88 MWh See separate excel file for monthly values.
Monitoring equipment	Electricity meter class CL200, type A3R model ELSTER ZE3300000L0, serial number 17548507 owned and maintained by the local energy distribution company. The electricity bills show the electricity consumed by the project. The electricity meter is

	situated in a box outside and locked with a padlock, only accessible by the electricity distribution company. The electricity meter meets ANSI C12.20 accuracy for accuracy class 0.2%. See the technical manual ("29. A3MeterTM42-2190BUSVersion.pdf").
QA/QC procedures to be applied	The electricity meter is an electronic meter, factory calibrated, and does not require user calibration (See "29. *A3MeterTM42-2190BUSVersion.pdf*"). Moreover, EBE has no access to this meter.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	

Data / Parameter	$TDL_{j,y}$
Data unit	Fraction
Description	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data	Annual and Multiannual Statistics of the Ecuadorian Electricity Sector 2023, in Spanish: "Estadística Anual y Multianual del sector eléctrico Ecuatoriano, 2023, Agencia de regulación y Control de Energía y Recursos Naturales No Renovables See https://www.controlrecursosyenergia.gob.ec/estadisticas-del-sector-electrico-ecuatoriano-buscar/ and "30. EstadisticaAnual2023-WEB-2.pdf".
Description of measurement methods and procedures to be applied	Scenario A of TOOL 05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" applies. The annual average value based on the most recent data available within the host country was chosen. (See TOOL05, version 03.0, Data / Parameter table 3) According to "Tool 05 Methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 03.0" (§7.2, Data / Parameter Table 3)" TDLj,y should be monitored annually. In absence of data from the relevant year, most recent figures are used, but not older than 5 years. The technical distribution losses and the transmission losses as presented in the annual and multiannual statistics of the Ecuadorian electricity sector are reported separately and need to

	be multiplied to obtain the combined technical transmission and distribution losses ($TDL_{j,y}$). TDLj,y in the following way: $TDL_{j,y} = 1- (DL_{j,y} - 1)*(TL_{j,y} - 1)$ Where, $TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y $DL_{j,y}$ = Average technical distribution losses of the distribution electricity system of Ecuador (%) to the project in year y $TL_{j,y}$ = Average transport losses of the national electricity transport system (SNT) of Ecuador (%) to the project in year y
Frequency of monitoring/recording	Annually
Value monitored	*Estadistica Anual y Multianual del sector electrico Ecuatoriano* 2023 Table 4, page 22 contains the technical distribution losses of host country Ecuador, being 6.40% in 2023. *Estadistica Anual y Multianual del sector electrico Ecuatoriano, 2023* Table 4, page 22 contains the transmission losses of the SNT (Systema National de Transmission) of host country Ecuador, being 4.53% in 2023. 2023 is the most recent year for which this information is available. Together these losses result in $TDL_{j,y}$ of 10.64%.
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	-

4.3 Monitoring Plan

The organizational structure, responsibilities and competencies of the personnel that carried out the monitoring activities

Project owner EBE operates the LFG plant that is part of the project and will measure the required monitoring data related to the project and is qualified to do so.

- The *general manager* of EBE legally represents the project owner. He/she is involved in high level decision making.
- The *supervising Engineer* of the plant in charge of the electrical, electronical and mechanical of the LFG extraction and energy generation plant will be responsible for on-site monitoring data collection. He is qualified to work with the monitoring equipment and preferably speaks English.
- Three *operators* working under the direct supervision of the supervising engineer support the supervising engineer to collect relevant monitoring data.

During the reported monitoring period David González Hidalgo was both the general manager and the supervising engineer of EBE.

BGP Engineers B.V. is responsible for interpretation of the monitoring data, and leakage effects, preparation of the monitoring reports and quality assurance. BGP will provide instructions and training to operators of EBE and operates as the *Project Manager* regarding monitoring in the frame of this VCS project.

Optionally, a *project advisor* is hired to support the project manager with monitoring and quality assurance. For the current monitoring period Martijn Vis of BTG was appointed as project advisor.

Jilles Nijboer of BGP was the Project Manager during the reported monitoring report and has appointed Martijn Vis of BTG as project advisor to support with monitoring and quality assurance.

The methods used for generating/measuring, recording, storing, aggregating, collating and reporting the data on monitored parameters.

With regards to monitoring AMS-III.G, AMS-I.D provides the following requirements:

1. Flow meters, sampling devices and gas analysers shall be subject to regular maintenance, testing and calibration to ensure accuracy. (AMS-III.G paragraph 27)
2. The quantities and types of biomass and the biomass to fossil fuel ratio (in case of co-fired system) to be used during the crediting period should be explained and documented transparently in the CDM-PDD. For the selection of the baseline scenario, an ex ante estimation of these quantities should be provided (AMS-I.D paragraph 44)
3. The applicable requirements specified in the "General guidelines for SSC CDM methodologies" (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines specified below and therefore shall be applied by the project participants (AMS-III.G paragraph 28 & AMS-I.D paragraph 45)

Conform the data and parameters monitored, the monitoring plan foresees in the metering of electricity generated by the engine-gensets ($EG_{PJ,facility}$), the electricity consumed ($EC_{project,y}$) and the efficiency of the engine-genset (EE_y).

The processes used for handling any internal auditing performed and any non-conformities identified.

The procedures below are related to the activities of the project manager.

The project manager stores and keeps the contracts, fills in data sheets and additional documentation in an orderly way.

The project manager keeps all paper and electronic documents at a safe place during the VCS project period, and longer, if required according to VCS-regulations.

The monitoring data collected from the project owners is processed in the following way:

1. Data is checked on completeness. If the data is not complete, the project manager contacts the supervising engineer by visit, phone, email or fax to ask for additional information.
2. Data is checked on calculation errors. If calculation errors occur, the supervising engineer is contacted by visit, phone, email or fax and asked for clarification, and if necessary additional explanation is given. This type of errors is noted and taken into account in the evaluation of the Monitoring Protocol.
3. If uncertainty exists on the monitoring data, a conservative approach will be applied in the interpretation of this data.
4. Data is entered into the central database, an excel sheet that contains all necessary calculation rules and procedures.
5. Consistency checks are carried out. If significant inconsistencies are observed, the project owner is asked for clarification. The technician of the project owner and project manager will jointly formulate a plausible explanation for the inconsistencies. If this approach does not work, the trouble shooting procedures will be followed.
6. The calculated emission reductions and other relevant information are reported in the monitoring report and offered to the verification body.

The project manager carries out corrective actions as stated in validation and/or verification reports, and/or otherwise as requested by the verification body. If appropriate, the project manager takes care that the project owner implements the corrective actions. The results of corrective actions will be described in the monitoring report of the subsequent period, or will be immediately send to the verification body, depending on its urgency.

The project manager prepares the concept monitoring report and internally checks the report on completeness and quality of data. The concept monitoring report is sent to the project advisor. The project advisor checks the concept monitoring report and the calculations and returns open questions to the project manager. After both project manager and project advisor are fully satisfied with the content of the final monitoring report, the verification body is requested to verify the monitoring report.

If problems occur related to the monitoring of the project performance, for instance data collection, measurement equipment, the data registration form, etc., the project manager will execute the following actions if problems are directly related to the monitoring of projects:

1. The project manager will try to explain and indicate solutions for problems by visit, phone, email or fax.
2. In case of problems that cannot be easily solved, the project manager will contact the project advisor. They will jointly formulate an approach to solve the problem.

3. All disputes that might arise from problems related to monitoring of the project performance will be settled as described in contracts that between project owner, project manager and project advisor.

The implementation of sampling approaches, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures. Where applicable, demonstrate whether the required confidence level or precision has been met.

Not applicable. For the parameters monitored, no sampling approached need to be applied. These parameters can be just measured and recorded.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions for the VCS project activity are calculated as follows for the considered monitoring period:

$$BE_y = BE_{CH4,y,} + BE_{electricity,y}$$

Where:

Parameter	Unit	Description
BE_y	tCO_2e	Baseline emission for in year y
$BE_{CH4,y}$	tCO_2e	Baseline emission from LFG avoidance that otherwise would be emitted to the atmosphere in absence of the Project in year y (tCO_2e) which is estimated as per AMS-III.G
$BE_{electricity,y}$	tCO_2e	Baseline emission from electricity displacement that otherwise would be provided by grid in year y (tCO_2e) which is estimated as per AMS-I.D

Baseline emission from landfill methane recovery ($BE_{CH4,y}$):

As per AMS-III.G paragraph 20 the baseline emission from landfill methane recovery achieved by the VCS project activity is calculated by calculating the amount of methane recovered and destroyed/utilized as follows:

$$\mathrm{BE_{CH4,PJ,y}} = (1 - \mathrm{OX}) \times \mathrm{F_{CH4,PJ,y}} \times \mathrm{GWP_{CH4}}$$

Where:

Parameter	Unit	Description
$\mathrm{BE_{CH4,PJ,y}}$	tCO_2e	Baseline emissions achieved by the project in year y.
OX	-	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering

		the waste) (dimensionless). A default value of 0.1 may be used.
$F_{CH4,PJ,y}$	tCH_4	Methane captured and destroyed/gainfully used by the project activity in the year y
GWP_{CH4}	-	Global Warming Potential for methane (value of 28)

At the project site a flare is installed. However, the flare is only operational in case the engine-generator sets of the project's electricity generation infrastructure are not under operational status. Emission reductions achieved due to flaring of LFG is not considered in the context of the determination of achieved emission reductions since no measurement instrument/equipment is installed (e.g. monitoring equipment/instrument) that meets the requirements of TOOL06 and TOOL08. Therefore, during *monitoring*, the baseline and project emissions of the use of the flare also will not be taken into account. ($ER_{flare} = BE_{flare} - PE_{flare} = 0$).

As per paragraph 21 of AMS-III.G, for project activities that utilize the recovered methane for power generation, $F_{CH4,PJ,y}$ can be alternatively directly calculated based on monitoring of the amount of net generated electricity (i.e., without monitoring methane flow and concentration) as follows:

$$F_{CH4,PJ,y} = \frac{EG_y \times 3{,}600}{NCV_{CH4} \times EE_y} \times D_{CH4}$$

Where:

Parameter	Unit	Description
EG_y	MWh	Electricity generation in year y
3,600	-	Conversion factor (1 MWh = 3,600 MJ)
EE_y	%	Energy Conversion Efficiency of the project equipment
NCV_{CH4}	MJ/Nm^3	NCV of methane
D_{CH4}	$t\ CH_4/Nm^3\ CH_4$	Density of methane

Remark: In AMS-III.G paragraph 23 the $F_{CH4,PJ,y}$ includes GWP_{CH4}. Since GWP_{CH4} is already included in $BE_{y,calculated}$, it has been left out. The resulting baseline emissions of landfill methane recovery are summarised in Table 1.

Table 2: baseline emissions of landfill methane recovery

Period	$EG_{PJ,facility}$	$F_{CH4,PJ}$	$BE_{CH4,y}$
01-January-2023 to 31-December-2023	4,644.31	925	23,303
Total	**4,644.31**		**23,303**

Baseline emissions from electricity displacement ($BE_{electricity,y}$)

Baseline emissions from electricity generation are calculated as follows:

$$BE_{electricity,y} = EG_{PJ,y} \times EF_{grid,y}$$

Where:

Parameter	Unit	Description
$BE_{electricity,y}$	t CO_2e	Baseline emissions from grid electricity displacement in year y
$EG_{PJ,y}$	MWh	Quantity of net electricity generated and injected into the electricity grid as a result of the implementation of the project activity in year y
$EF_{grid,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for grid connected power generation in year y (calculated using the latest version of the CDM methodological tool "Tool to calculate the emission factor for an electricity system").

As per paragraph of AMS-I.D, if the project activity is the installation of a greenfield power plant, therefore:

$$EG_{PJ,y} = EG_{PJ,facility,y}$$

Where:

$EG_{PJ,facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

$EF_{grid,y}$ is ex-ante determined and is fixed during the first crediting period.

The resulting baseline emissions of landfill methane recovery are summarized in *Table 3*. The detailed calculations are presented in GHG calculation spreadsheet "VCS ER calculation Project 1883 01JAN2023-31DEC2023.xls" which is enclosed to this Monitoring Report.

Table 3: Baseline emissions from electricity generation

Period	$EG_{PJ,facility}$	$EF_{grid,y}$	$BE_{electricity,y}$
01-January-2023 to 31-December-2023	4,644	0.3349	1,555
Total	**4,644**		**1,555**

5.2 Project Emissions

Project emissions includes two parts, which are calculated as per AMS-III.G and AMS-I.D separately: .

$$PE_y = PE_{CH4,y,} + PE_{electricity,y}$$

Where:

Parameter	Unit	Description
PE_y	tCO_2e	Project emissions in year y
$PE_{CH4,y}$	tCO_2e	Project emissions of landfill methane recovery estimated as per AMS-III.G
$PE_{electricity,y}$	tCO_2e	Project emissions from LFG electricity generation estimated as per AMS-I.D

Project emissions landfill methane recovery

As determined in the "VCS-Joint-Project-Description-Monitoring-Report 7 July 2019 v2.pdf" the project emissions from landfill methane recovery in this project can be described as follows:

$$PE_{CH4,y} = PE_{power,y} + PE_{flare,y}$$

Where:

Parameter	Unit	Description

PE_y	t CO_2e	Project emissions in year y
$PE_{power,y}$	t CO_2e	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y
$PE_{flare,y}$	t CO_2e	Emissions from flaring or combustion of the landfill gas stream in the year y

At the project site a flare has been installed that is operational in case the engine-generator sets of the project's electricity generation infrastructure are not operational. Emission reductions due to combustion of LFG in the installed flare are not accounted as part of the monitoring of the VCS project activity, since no appropriate measurement equipment/instrument is yet installed (i.e. monitoring equipment/instrument that meets the requirements of CDM methodological tool TOOL06 and TOOL08). Therefore, during the considered *monitoring period,* baseline emissions and project emissions associated with the combustion of LFG in the flare are not taken into account. (ER_{flare} = BE_{flare} – PE_{flare} = 0). Consequently, the project emissions due to combustion of LFG by flaring are not taken into account. This is a conservative approach since in reality the flare has destroyed methane part of the year.

Therefore, $PE_{CH4,y} = PE_{power,y}$

Project emissions from consumption of grid-sourced electricity by the VCS project activity are determined as follows:

$$PE_{power,y} = EC_{project,y} \times EF_{grid,y} \times (1 + TDL_{j,y})$$

Where:

Parameter	Unit	Description
$PE_{power,y}$	tCO_2e	Emissions from the use of electricity for the operation of the installed facilities in the year y (t CO_2e)
$EC_{project,y}$	MWh	The quantity of electricity used for the operation of the installed facilities in the year y
$EF_{grid,y}$	tCO_2e/MWh	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the CDM methodological tool "Tool to calculate the emission factor for an electricity system"
$TDL_{j,y}$	Fraction	Average technical transmission and distribution losses for providing electricity to source j in year y

$EF_{grid,y}$ has been determined ex ante and is fixed during the first crediting period.

The most recent available (2022) value of TDLj,y is 10.39%.

The resulting baseline emissions of landfill methane recovery are summarised in Table 4. The detailed calculations are presented as separate annex ("VCS ER calculation Project 1883 1JAN2023-31DEC2023.xls) to this monitoring report.

Table 4: Monitored project emissions from the operation of the installed facilities

Period	$EC_{project,y}$	$EF_{grid,y}$	$PE_{power,y}$
01-January-2023 – 31-December-2023	155.88	0.3349	58
Total	**155.88**		**58**

Project emissions renewable electricity production

As determined in "VCS-Joint-Project-Description-Monitoring-Report 7 July 2019 v2.pdf" the project emissions from renewable electricity production are zero.

5.3 Leakage Emissions

As determined in "VCS-Joint-Project-Description-Monitoring-Report 7 July 2019 v2.pdf" leakage emissions from landfill methane recovery and replacement of grid connected electricity can be set at zero.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

The GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y = BE_{ch4,y} + BE_{electricity,y} - PE_{ch4,y} - PE_{electricity,y} - 0$$

Where:

Parameter	Unit	Description
ER_y	tCO_2e	Emission reduction in year y
BE_y	tCO_2e	Baseline emission in year y
$BE_{CH4,y}$	tCO_2e	Baseline emission in year y from LFG avoidance that otherwise would be emitted to the atmosphere in absence of the Project in year y (tCO_2e) which is estimated as per AMS-III.G

$BE_{electricity,y}$	tCO_2e	Baseline emission from electricity displacement that otherwise would be provided by grid in year y (tCO_2e) which is estimated as per AMS-I.D
PE_y	tCO_2e	Project emissions in year y
$PE_{CH4,y}$	tCO_2e	Project emissions of landfill methane recovery estimated as per AMS-III.G
$PE_{electricity,y}$	tCO_2e	Project emissions from LFG electricity generation estimated as per AMS-I.D
LE_y	tCO_2e	Leakage emissions in year y, which are set to zero.

The net GHG emission reductions and removals are summarized in the table below. These consist of one vintage:

(1) 1-January-2023 to 31-December-2023

Vintage period	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage emissions (tCO_2e)	Reduction VCUs (tCO_2e)	Removal VCUs (tCO_2e)	Total VCUs (tCO_2e)
01-January-2023 to 31 December 2023	24,859	58	0	24,801	0	24,801
Total	**24,859**	**58**	**0**	**24,801**	**0**	**24,801**

Table 11 of the "VCS Joint Project Description Monitoring report 7 July 2019 v2.pdf" gives the ex ante emission reduction calculation of the first crediting period, which are used in the second column of the Table below.

Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
01 January 2023 to 31-December 2023	36,755	24,801	-33%	The main explanatory factor for the difference is the fact that the landfill gas supply was below the level as initially calculated during validation. It is noted that in 2023 the project was not able to uptake a substantially larger landfill gas supply as the second engine-generator broke down and was not operational

				between 9-May-2023 and 31 Dec 2023, as further explained in section 3.1.
Total	36,755	24,801	-33%	

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

No commercially sensitive information was included in the monitoring report that will be excluded in the public version.