



VERIFICATION REPORT FOR THE HENRICO COUNTY LANDFILL GAS COMBUSTION PROJECT



Document Prepared by First Environment, Inc.

Project Title	Henrico County Landfill Gas Combustion Project
Version	1
Report ID	1

Report Title	Verification Report for the Henrico County Landfill Gas Combustion Project
Client	Anew Carbon Development, LLC
Pages	33
Date of Issue	24-January-2024
Prepared By	First Environment, Inc.

Contact	10 Park Place, Bldg 1A, Suite 504 Butler, New Jersey 07405 Tel: 973-334-0003 www.firstenvironment.com jjd@firstenvironment.com
Approved By	Jay Wintergreen
Work Carried Out By	Jeff Daley Logan Simpson

Summary:

This report is provided to Anew Carbon Development, LLC (Anew), and the County of Henrico (Henrico County) as a deliverable of the Verified Carbon Standard (VCS) project verification process for the Henrico County Landfill Gas Combustion Project (the Project) located in Glen Allen, Virginia.

The landfill is divided into three separate and distinct areas: East Fill, West Fill, and the Expansion. Prior to the Project activity, landfill gas was collected from the East Fill area and destroyed in an open flare. The Project consists of gas collection from the Expansion area and was implemented in two stages. Stage One of the Project involved expansion of the pre-existing wellfield and installation of an open flare. Stage Two consists of a beneficial use application where landfill gas is collected and sent to an on-site power generating facility for destruction in engines to generate electricity. Both stages of the Project are currently active, and each achieves a net reduction in CO₂-equivalents through the avoidance of methane emissions that otherwise would have been released to the atmosphere.

The verification process and scope consist of the independent third-party assessment of the implementation of the project and emission reduction assertion against the criteria stated in the Verified Carbon Standard (VCS) Standard, 11 December 2023, v4.5; the approved Clean Development Mechanism (CDM) Methodology ACM0001 "Flaring or use of landfill gas" Version 19 and the validated VCS Project Description (VCS PD). The purpose of the verification is to ensure the project was implemented and monitored in accordance with the validated Project Description and underlying CDM Methodology.

No uncertainties were identified during the verification process.

During the verification process, First Environment, Inc. (First Environment) issued six corrective action requests and one clarification request, all of which were addressed sufficiently by Anew. The Project claims emission reductions of 36,758 tonnes CO₂e for the period of January 1 through December 31, 2022. First Environment is reasonably assured that the Project meets all relevant

VCS program requirements and correctly applies the CDM methodology ACM0001 (Version 19) and the validated VCS PD.

1	Introduction	5
1.1	Objective	5
1.2	Scope and Criteria	5
1.3	Level of Assurance.....	7
1.4	Summary Description of the Project	7
2	Verification Process	7
2.1	Method and Criteria.....	7
2.2	Document Review	10
2.3	Interviews	10
2.4	Site Visits.....	11
2.5	Resolution of Findings	11
2.5.1	Forward Action Requests	11
2.6	Eligibility for Validation Activities	11
3	Validation Findings	11
3.1	Participation under Other GHG Programs	12
3.2	Methodology Deviations.....	12
3.3	Project Description Deviations.....	12
3.4	Grouped Project	13
4	Verification Findings	14
4.1	Project Implementation Status	14
4.2	Safeguards	18
4.2.1	No Net Harm	18
4.2.2	Local Stakeholder Consultation	18
4.3	AFOLU-Specific Safeguards	18
4.4	Accuracy of GHG Emission Reduction and Removal Calculations	18
4.5	Quality of Evidence to Determine GHG Emission Reductions and Removals	24
4.6	Non-Permanence Risk Analysis.....	24
5	Verification OPINION	24
	APPENDIX A: Resolution of Findings	27
	APPENDIX B: List of Documents	29

1 INTRODUCTION

1.1 Objective

This report is provided to Anew Carbon Development, LLC. (Anew), and the Project Proponent; County of Henrico (Henrico County) as a deliverable of the Verified Carbon Standard (VCS) project verification process for the Henrico County Landfill Gas Combustion Project (the Project) located in Glen Allen, Virginia. This report covers the verification of greenhouse gas (GHG) emission reductions from the destruction of landfill gas that otherwise would be vented to the atmosphere during the period from January 1, 2022 through December 31, 2022. First Environment, Inc. (First Environment) conducted the verification from the date of the kick-off meeting through December 4, 2023.

Anew and Henrico County are both responsible parties for the GHG statement under verification. Anew was responsible for the preparation and fair presentation of the GHG statement. Henrico County was responsible for implementing the data management and meter calibration activities for the Project. First Environment is responsible for expressing the opinion below on the GHG statement based on the outcome of the verification process.

The purpose of this verification was, through review of appropriate evidence, to establish that:

- the Project conforms to the requirements of the verification criteria, including all requirements, discussed in Section 1.2 of this report; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

Verification activities also include reaching a conclusion about the accuracy of the GHG statement and the conformity of the statement with criteria.

1.2 Scope and Criteria

The specific scope metrics for the verification are outlined in the table below:

Reporting Period	January 1 – December 31, 2022
Emission Sources Verified	Baseline Sources • CH₄ emission reductions resulting from the destruction of landfill gas. • CH₄ emission reductions resulting from the pre-project destruction of landfill gas. Project Sources • CO₂ emissions from on-site fossil fuel consumption in support of the project activity.

	• CO2 emissions from electricity consumption by the project activity • CH4 emissions from uncombusted methane
Definition of Materiality	• Misstatements of greater than five percent of the Project's GHG assertion. The Project activity generated less than 300,000 tonnes of CO2e per year and therefore falls under the "Project" scale. • Qualitative non-conformities with Standards of Verification described below

The following table outlines the guidance and protocols used to conduct this verification:

Standards of Verification	• VCS Standard, 11 December 2023, v4.5 (VCS Standard) • Validated VCS Project Description (VCS PD), August 28, 2020 • Approved CDM Methodology ACM0001 "Flaring or use of landfill gas" Version 19
Verification Process	• VCS Standard • VCS Program Guide, Version 4.4, 29 August 2023 • ISO 14064-3: Specification with guidance for the verification and validation of greenhouse gas statements, 2019

The Monitoring Report dated 9 August 2024; Version 3.0 titled “Henrico County Landfill Gas Combustion Project” was also reviewed to inform the verification assessment.

1.3 Level of Assurance

First Environment and Anew have agreed that a reasonable level of assurance be applied for the Project. A reasonable level of assurance was chosen because this is what is required by the Verra program. Details on how reasonable assurance was met throughout the verification process is discussed in Sections 2 and 4.5 below.

1.4 Summary Description of the Project

The Project is located at the Springfield Road Landfill (the Landfill) at 10600 Fords Country Lane (Latitude: 37° 40' 45", Longitude: 77° 33' 58"). Henrico County is the Project Proponent and is the owner and operator of the landfill and flare. Archaea Energy (formerly Industrial Power Generating Company) is the owner and operator of the power plant and per VCS guidance dated March 4, 2022, is designated in the Monitoring Report as “Other Entities Involved in the Project”. The Project consists of two stages: (1) expansion of the existing landfill gas collection system and destruction of landfill gas in an open flare; (2) implementation of a beneficial use project by which landfill gas is destroyed in a series of engine-generator units at the Industrial Power Generating Company power facility with a total capacity of four megawatts. These activities result in a net reduction of CO₂e emissions.

The VCS PD provides additional details regarding the project activity.

2 VERIFICATION PROCESS

The verification process consisted of an assessment of the Project’s implementation, as described in the Monitoring Report, against the verification criteria described above, as well as an assessment of the GHG emission reduction assertion. Discrepancies between project documentation and the verification criteria were considered material and identified for corrective action. Deviations were evaluated on the basis of the requirements in ACM0001 and the VCS Standard and required appropriate justification from Anew. Deviations discussed in Sections 3.2 and 3.3 below were validated in accordance with the requirements of the VCS Standard.

2.1 Method and Criteria

To review the Project’s GHG information, the following verification process was used:

- conflict of interest review;
- selection of Audit Team;

- Verification preparations;
- initial interaction and kick-off meeting with Anew;
- development of the verification and evidence gathering plans;
- execution;
- site visit;
- assessment and evaluation of raw data, calculations, and supporting documentation for the period under review;
- follow-up interaction with Anew for corrective action or supplemental data as needed;
- independent review; and
- final opinion and report submittal.

The verification process was utilized to gain an understanding of the Project's GHG emission sources and reductions and to evaluate and verify the collection and handling of data, the calculations that lead to the results, and the means for reporting the associated data and results.

2.1.1 Conflict of Interest Review

Prior to beginning any verification project, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the project. No potential conflicts were found for this project.

2.1.2 Audit Team

First Environment's Audit Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with landfill gas projects:

Jeff Daley – Lead Auditor

Logan Simpson - Auditor

James Wintergreen – Internal Reviewer

2.1.3 Strategic Analysis and Verification Preparations

First Environment performed pre-engagement activities to confirm the type of engagement, level of assurance, materiality thresholds, the objectives, criteria, and scope for verification activities. The Audit Team reviewed the VCS PD as a basis for verification preparations.

First Environment also performed a strategic analysis to understand the activities and complexity of the project and to determine the nature and extent of the verification activities required. The strategic analysis was also used to develop sufficient understanding of the GHG-related activity and its relevant sector information to plan and conduct the verification.

2.1.4 Audit Kick-off

The verification audit was initiated with a kick-off conference call on January 31, 2023 between First Environment and the Anew team. The communication focused on confirming the verification scope, objectives, criteria, schedule, and the data required for the verification.

2.1.5 Development of the Verification and Evidence-Gathering Plans

The Audit Team formally documented the verification plan as well as determined the evidence gathering plan. The verification plan was informed by the kick-off meeting where key elements of the verification scope were discussed including project team members, project level of assurance, materiality threshold, and standards of reporting and evaluation. It also provided an outline of the verification processes and established project deliverables. Anew was afforded the opportunity to comment on the key elements of the plan for verification. A separate evidence gathering plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

2.1.6 Execution of Evidence Gathering Activities

The Audit Team executed the evidence-gathering activities. The verification was conducted according to the verification plan and the evidence-gathering activities according to the evidence-gathering plan.

2.1.7 Site Visit

First Environment performed a site visit on November 17, 2023 as part of the verification process. The site inspection included a tour of the landfill, all destruction devices, and all associated ancillary equipment (i.e., metering and data recording systems). Site visit activities are discussed in further detail in Section 2.4 below.

2.1.8 Emissions Reduction Data and Calculation Assessment

The Audit Team performed a desktop review of the Monitoring Report, GHG emission reduction assertion, and supporting documentation, as further described in Section 2.2 below.

2.1.9 Corrective Actions and Supplemental Information

The Audit Team issued requests for supplemental information, corrective action, and clarification during the verification process. The corrective action and clarification requests and the responses provided by Anew are summarized in Section 2.5.

2.1.10 Independent Review

Before verification reporting is released to the client, a First Environment lead verifier, who has not participated in the verification activities, conducts an independent review to confirm that all verification activities have been completed and provide the agreed upon level of assurance.

2.1.11 Verification Reporting and Opinion Issuance

Verification reporting, represented by this report, documents the verification processes and identifies their findings and results. Verification reporting consists of this report for Anew, along with a separate Deed of Representation. Both the report and Deed of Representation are submitted to Verra as part of the verification reporting process.

The verification opinion reached is identified and discussed in Section 5 below.

2.2 Document Review

During the verification process, First Environment reviewed the Project's Monitoring Report, GHG emission reduction assertion, and supporting documentation for the current verification period to ensure consistency with the VCS Standard, ACM0001, and the VCS PD. A verification conformance checklist was developed for the Project which summarizes the criteria used to evaluate the Project, the Project's conformance with each criterion, and the Audit Team's verification findings. Discrepancies between project documentation and the verification criteria were considered material and identified for corrective action. Deviations required appropriate justification from Anew. Additionally, First Environment assessed the GHG emission reduction assertion and underlying monitored data to determine if either contained material or immaterial misstatements. The results of these reviews are discussed in greater detail below.

2.3 Interviews

Through the course of verification activities and the site visit, First Environment interviewed the following project personnel via phone and in person to inform the verification process:

Braulio Garcia – Anew; Responsible Party

Derek Berry – TRC Companies; Consultant/Engineer for Henrico County

Randolph Scott – Archaea Energy; Energy plant owner

Anew personnel were responsible for putting together the monitoring report, emission reduction calculations and participating in the overall verification process. Interviews and discussions with Anew focused on these aspects of reporting. Henrico County and Archaea Energy personnel were responsible for implementing the monitoring plan, and providing information related to calibrations, meter maintenance, data collection and management. Including providing supporting documentation for all baseline sources, project emission sources as well as calibration documentation. Interviews and discussions with Henrico County and Archaea Energy focused on these aspects of reporting.

2.4 Site Visits

An in-person site visit was conducted at the Project facility with the objective of confirming that the project is implemented in accordance with the description identified in the validated VCS PD and subsequent Monitoring Report for the current reporting period. Mr. Jeff Daley performed a site visit on November 17, 2023 as part of the verification process. The site visit included interviews with relevant site personnel and project stakeholders; review of the Project's operations; data collection procedures and information data management systems; as well as assessments of the Project's controls for sources of potential errors and omissions. The site inspection included a tour of the landfill, all destruction devices, and all associated ancillary equipment (i.e., metering and data recording systems).

2.5 Resolution of Findings

The Audit Team issued six requests for corrective action, one request for clarification, and zero forward action requests during the verification process. There were no outstanding forward action requests from the validation or previous verifications. Anew's responses were sufficient to resolve all requests. The corrective action and clarification requests and the responses provided are summarized in the tables found in Appendix A.

2.5.1 Forward Action Requests

There were no Forward Action Requests issued during the current verification.

2.6 Eligibility for Validation Activities

First Environment is accredited to perform validation activities as described in Section 3 below for activities in Sectoral Scope 1 (energy industries: renewable/non-renewable sources), and Sectoral Scope 13 (waste handling and disposal), which is the applicable scope for the approved methodology ACM0001.

3 VALIDATION FINDINGS

As described in Section 3.3 below, five Project Description deviations were validated during the current reporting period. First Environment reviewed justification for all deviations, including supporting documentation, to confirm they were consistent with the underlying methodology and did not negatively impact the conservativeness or accuracy of the emission reductions. The validation process for each deviation consisted of an assessment of the Project's implementation, as described in the Monitoring Report and from discussions with Anew, against the validation criteria. The validation criteria considered in the assessment of any deviations included the approved CDM methodology ACM0001, v19 and the VCS standard.

3.1 Participation under Other GHG Programs

During the verification process, First Environment reviewed written confirmation from Anew confirming that GHG emission reduction credits from the Project have not been registered under another GHG program.

First Environment concluded that the Project is eligible to participate under the VCS program.

3.2 Methodology Deviations

Section 4.1 identifies methodology deviations previously validated for the Project. No new methodology deviations were identified during the current reporting period.

3.3 Project Description Deviations

The following project description deviations are proposed in the Monitoring Report for the current reporting period:

- The VCS PD identifies that the continuous gas analyzer is an Ecotec FAU-TDL analyzer. This analyzer was replaced on May 28, 2020 with a Siemens Ultramat 23 gas analyzer (s/n: N1M4372). First Environment approved this deviation because the gas analyzer was replaced with an analyzer of similar type and is installed at the same location as the original analyzer. The installation of a new gas analyzer does not negatively impact the accuracy of the GHG assertion.
- The flare flow meter was replaced in 2021 with an identical make/model meter with the only difference being the set standard conditions of each meter. The original meter recorded flow readings at standard conditions of 68°F and one atmosphere of pressure. The new flare flow meter records flow readings at standard conditions of 60°F and one atmosphere of pressure. The original meter was replaced due to its age, and the facility decided to purchase a new meter. First Environment approved this deviation because the flow meter was replaced with an identical meter and is installed at the same location as the original meter. The installation of a new flow meter does not negatively impact the accuracy of the GHG assertion.
- The VCS PD identifies that the flow meter recording engine flow is set at reference conditions of 68°F and one atmosphere of pressure. The flow meter actually records flow readings at standard conditions of 60°F and one atmosphere of pressure. This was confirmed through review of manufacturer documentation for this specific meter. First Environment approved this deviation because it corrects an error in the validated VCS PD. Additionally, see deviation below related to the use of corresponding methane densities. By identifying this error as a deviation the Monitoring Report provides clarity on the metering at the landfill. This deviation does not negatively impact the accuracy of the GHG assertion.

- The VCS PD identifies only one methane density value corresponding to standard temperature conditions of 68°F, which is consistent with the standard temperature condition for landfill gas flow recorded by the flare flow meter. The engine plant flow meter records flow at standard temperature conditions of 60°F, while the pre-project monitoring used for the baseline discount measured flow at standard temperature conditions of 70°F. For this reason, two new methane density values have been applied in the emission reduction calculations to correspond to the standard temperature conditions of each meter. First Environment approved this deviation because it results in greater accuracy of the emission reduction assertion.
- The VCS PD identifies that the electricity meter measuring Project electricity generation will be calibrated every six months. Documentation of calibration is not available for this meter. The meter is the Utility's electricity revenue grade meter and therefore is assumed to be accurate. First Environment approved this deviation because the data from this meter is not directly used to quantify emission reductions. The data output from this meter is used to simply determine if the engines are on or off by conducting a comparison between landfill gas flow and engine operability to ensure that there is no LFG destruction claimed at times when no electricity generation is reported. Therefore, the emission reduction assertion is not adversely affected due to the lack of calibration record availability.
- The VCS PD identifies both the County of Henrico and Ingenco Distributed Energy (now Archaea Energy) as Project Proponents. The Monitoring Report only identifies a single Project Proponent: the County of Henrico. Archaea Energy (formerly Ingenco Distributed Energy) is identified as "Other Entities Involved in the Project". First Environment approved this deviation because it is consistent with guidance provided by Verra on March 4, 2022 to Anew during the VCU issuance process of the prior reporting period.
- The VCS PD identifies that parameter FC_{diesel} (volume of diesel fuel consumption) is measured by a Micromotion Coriolis Flowmeter. In lieu of tracking diesel fuel consumption with a flow meter, the Project tracks diesel fuel consumption via purchase invoices from the fuel supplier. For the duration of the reporting period all diesel usage was monitored via purchase invoices. All diesel fuel delivered during the reporting period is accounted for in the calculation of project emissions. First Environment approved this deviation because accounting for all fuel delivered during the reporting period whether it was consumed or not is a conservative approach. Additionally, fuel quantity is based off of purchase invoices which represents a financial transaction and therefore ensures accuracy in the values reported.

All of the project deviations described above did not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario, and the Project remained in conformance with all other ACM0001 and VCS requirements. In addition, Anew provided appropriate descriptions and justifications for each deviation. The project deviations were deemed to be valid.

3.4 Grouped Project

Not Applicable – the project is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The Project is implemented according to the description provided in the VCS PD, except where noted in Section 3 above, and relative to previously validated deviations identified below. The Project became operational on June 3, 2005. The second 10-year Project crediting period began on January 1, 2019 and ends on December 31, 2028. First Environment previously confirmed the Project's start date during the Project's first validation. Emission reductions are claimed for landfill gas from the expanded gas collection system installed at the Landfill. The Project consists of two stages. Collected eligible landfill gas is destroyed in an open flare (Stage 1) or in a series of engine generators to produce electricity (Stage 2). Additionally, collection and destruction of landfill gas in a pre-existing open flare prior to the Project's start date occurred at the facility. As a result, methane destroyed in the pre-existing gas collection system is accounted for in the emission reduction assertion consistent with the VCS PD.

No data and/or variables presented in the Monitoring Report differ from those stated in the VCS PD, except where noted in Section 3.3 above or as described below. Similarly, the data collection and recordkeeping procedures were found to be consistent with those outlined in the monitoring plan described by the VCS PD and meet the requirements of ACM0001.

The Project has adequate management and operational systems in place with respect to monitoring and reporting, as determined through observation during the site visit and the desktop review of project documentation. The monitoring plan was found to be suitable and implemented sufficiently for the Project activity. No material misstatements between the actual monitoring system and the monitoring plan as set out in the PD were identified, except where noted in Sections 3.2 and 3.3 above.

Similarly, the data collection and recordkeeping procedures were found to be consistent with those outlined in the monitoring plan described by the VCS PD and meet the requirements of ACM0001. The Project has adequate management and operational systems in place with respect to monitoring and reporting, as determined through previous observation during the site visit, interviews with Project personnel during the current reporting period, and the desktop review of project documentation.

During the verification process, First Environment reviewed written confirmation from Anew confirming that GHG emission reduction credits for the current reporting period have not been registered under another GHG program.

The Project is not in a supply chain where GHG emissions issued are associated with goods, services, or Scope 3 emissions.

The audit history table found in Section 1.1 of the Monitoring Report was reviewed by First Environment and found to accurately reflect the Projects audit history.

The Project contributes to Sustainable Development Goals (SDG), as identified in Section 1.11 of the Monitoring Report. First Environment found that the SDG contributions described in the Monitoring Report have been implemented by the Project. This was confirmed through review of emission reduction calculations, landfill gas flow, and methane data. The Project activity contributes to the following SDG's:

- SDG Goal 13: Climate Action (Target 13.2 / SDG Indicator 13.2.2) - The Project contributes to this indicator by avoiding methane emissions from the landfill. These actions result in a net reduction of CO2 equivalent emissions. The Monitoring Report provides further details and justifications for the contributions over the Project lifetime.

Only one SDG was identified in the Monitoring Report as the Project is not required to identify at least three SDG's until 20 January 2025.

The Project activity does not claim emission reduction credits for the displacement of fossil generated electricity. Therefore, no double counting of environmental attributes associated with electricity production and carbon credits has occurred.

The following topics were discussed with project personnel during the site visit:

- the data collection process used to generate reports, and
- internal documents and protocols that set guidelines for the data collection process.

The information gathered during these discussions was used to assess the Project's data management systems and its controls for sources of potential errors and omissions. The primary aspects of the Project's monitoring plan are described below.

The quantity of LFG sent to the flare is continuously measured using a Rosemount Orifice Plate flow meter. The quantity of LFG sent to the engine is also continuously measured using a Rosemount Orifice Plate flow meter. All flow data are recorded by the Project's Red Lion data logger every five minutes. Additionally, as a backup, engine totalized engine flow data is recorded daily by Archaea Energy. Flow data is also uploaded and stored on remote servers by TRC Companies (TRC; formerly Draper Aden Associates), the County's third-party engineering consultant.

Methane concentration data is recorded by the Project's Red Lion data logger every five minutes. Methane data is also uploaded and stored on remote servers by TRC. Additionally, as a backup, TRC takes periodic methane readings with a portable gas analyzer. Additionally, Archaea Energy operators take methane concentration readings with a portable gas analyzer daily. No portable methane analyzer readings were used during the current reporting period to quantify emission reductions.

The flow meters and continuous methane analyzer were calibrated in accordance with the requirements of the VCS PD. Table 1 below identifies the dates each meter was calibrated:

TABLE 1: Meter QAQC

Meter	Location	Dates of Use	Calibration Date	VCS PD calibration frequency
Rosemount (s/n: 25855)	Flare	Entire reporting period	7/20/2021; 8/18/2021** 6/29/2022	Once every three years
Rosemount (s/n: 306661)	Engine	Entire reporting period	12/10/2021; 1/9/2023	Once every three years
Thermocouple (K-type)	Flare	Entire reporting period	7/20/2021; 6/29/2022	Annually
Siemens Ultramat 23 (s/n: N1M4372)	Header Line	Entire reporting period	9/30/2021 7/20/2022 *	Annually

* Field calibration accuracy check performed by third party (TRC).

** Orifice Plate inspection.

First Environment reviewed the calibration records for all meters identified in Table 1 to confirm that each meter was operating within the five percent accuracy threshold established by the Standard.

The open flare uses a series of Type K thermocouples to continuously monitor flare temperature as well as a UV sensor to monitor the presence of a flame. The temperature is recorded by the Red Lion data logger every five minutes. First Environment confirmed that no emission reductions were claimed when flare temperature indicated the flare was non-operational.

The operation of the power plant is demonstrated by engine run time recorded every five minutes, and kilowatt production data which is monitored continuously and recorded daily by a SCADA system.

The Project imports electricity from the grid. Electricity consumption is monitored using monthly utility invoices. The Project also consumes propane for the flare pilot light system and diesel fuel by the power plant. Propane and diesel usage are determined from purchase invoices.

The following methodology deviations identified in the VCS PD were previously validated for the Project during the Project's crediting period renewal validation:

- Project emissions resulting from purchased grid electricity are quantified by using an electricity emission factor sourced from the U.S. EPA eGRID database for the sub-region in which the Project is located, as opposed to quantifying a grid electricity emission factor by using Tool to calculate the emission factor for an electricity system, or by applying a default electricity emission factor. This deviation was approved during the Project's validation process.
- The ex-ante emission reduction estimates were not estimated using the CDM "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site." Instead, ex-ante emission reductions were estimated based on historical information and data from the Project's first 10-year crediting period. This deviation was approved during the Project's validation process.
- The default flare efficiency of the open flare was assigned a value of 98 percent as opposed to the 50 percent default efficiency for open flare as found in the CDM Tool "Project emissions from flaring," Version 3.0. This deviation was approved during the validation process because the 98 percent flare efficiency is representative of the typical flare efficiency for an open flare operated under United States (US) Environmental Protection Agency (EPA) 40CFR60.18, as is the case for

the project flare. Furthermore, the applied flare efficiency yields a more accurate representation of emission reductions.

The data collection and recordkeeping procedures utilized were found to be consistent with those outlined in the monitoring plan described in the VCS PD and meet the requirements of ACM0001, except where noted above.

The Project has not received or sought another form of environmental credit, nor has it become eligible to do so since the validation. Additionally, the Project boundary has been drawn to exclude environmental attributes from renewable energy generation.

Overall, the Project is implemented according to the description provided in the VCS PD (except where deviations are noted above) and the monitoring system implemented was found appropriate to the task of obtaining, recording, compiling, and analyzing the monitored data and parameters.

4.2 Safeguards

4.2.1 No Net Harm

The Project creates no negative environmental or socio-economic impacts. The Project activity takes place on privately owned land and therefore does not impose any human-induced risks to stakeholder's well-being, or to marginalized groups in the local community.

4.2.2 Local Stakeholder Consultation

The Project operates in accordance with several permits to ensure protection of the environment. The landfill is owned by a public entity and therefore local stakeholders can submit input at any time to the Landfill Manager or Public Works Department. No ongoing comments or concerns were submitted during the reporting period.

4.3 AFOLU-Specific Safeguards

Not Applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

Emission reductions are calculated ex-post using the approach indicated in ACM0001 and the VCS PD. First Environment reviewed the emission reduction calculations for the verification period to ensure accuracy in the formulas applied and the raw data and default factors used as inputs. First Environment's review assessed whether emission reductions were free of material misstatement. The formulas were tested and found to be consistent with the calculations described in ACM0001 and the VCS PD.

Landfill gas flow sent to the flare (LFGflare) and engine (LFGelectricity) are measured continuously, and the methane fraction of the landfill gas (WCH4) measured by the continuous gas analyzer and are used to calculate the total amount of methane destroyed by the Project (FCH4,PJ,y).

Landfill gas combusted by the flare (LFGflare) is measured continuously, and the methane fraction of the landfill gas (WCH4) measured by the continuous gas analyzer are used to calculate the total amount of methane destroyed by the flare (FCH4,flared,y). The total monthly quantities of landfill gas are determined by taking the continuous flow readings and summing them over the reporting period. The flare flow meter automatically corrects flow data to standard conditions of 60°F and 14.70 psi. Methane density consistent with the metered flow standard conditions (0.000678 tCH₄/m³ CH₄ at 60°F) is multiplied by total methane flow to convert the methane destroyed from a volumetric flow to a mass flow. A thermocouple measures flare temperature to ensure methane destruction. Any flow data with associated flare temperatures below 110°F are excluded from emission reduction calculations.

Landfill gas combusted by the engine (LFGelectricity) is measured continuously, and the methane fraction of the landfill gas (WCH₄) measured by the continuous gas analyzer are used to calculate the total amount of methane destroyed by the engine (FCH₄,EL,y). The total monthly quantities of landfill gas are determined by taking the continuous flow readings and summing them over the reporting period. The engine flow meter automatically correct flow data to standard conditions of 60°F and 14.70 psi. Methane density consistent with the metered flow standard conditions (0.000678 tCH₄/m³ CH₄ at 60°F) is multiplied by total methane flow to convert the methane destroyed from a volumetric flow to a mass flow.

Project emissions from uncombusted methane during flaring, fossil fuel usage, and grid purchased electricity consumption are deducted from the overall emission reductions created by the Project. Project emissions from uncombusted methane are calculated in accordance with the VCS PD. Project emissions from fossil fuel usage are quantified by multiplying the activity data by the appropriate emission factor. Project emissions from electricity consumption are quantified by multiplying the activity data by the appropriate emission factor and transmission and distribution loss factor.

Because landfill gas was collected and destroyed prior to the project activity, this amount of methane destroyed is (FCH₄,BL,y) subtracted from baseline emissions in accordance with the VCS PD.

The verification process focused on the evaluation of quantification spreadsheets to ensure that they were consistent with the formulas and equations described in ACM0001 and the VCS PD. Copies of the raw data used in the calculations, including flow and methane concentration data and utility and other fossil fuel invoices, were compared with the values used in the final calculations and tested for transcription or mathematical errors. The calculations for the entire period were reviewed as well to determine whether they were free of material misstatement. All calculation methods, monitored parameters, and emission factors used to determine emission reductions were consistent with those outlined in the validated PD. Specifically, Table 2 below identifies all monitored parameters as identified in both the validated VCS PD and Monitoring Report. First Environment's assessment of each parameter is identified below. The VCS PD and Monitoring Report contain full descriptions of each parameter:

Table 2: Parameter Assessment

Parameter	Documentation Provided	Appropriateness of Value	QA/QC Procedures applied
$F_{CH_4,PJ,y}$	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
$F_{CH_4,flared,y}$	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
$F_{CH_4,sent\ to\ flare,y}$	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
$PE_{flare,y}$	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.

Parameter	Documentation Provided	Appropriateness of Value	QA/QC Procedures applied
LFG _{flare}	Raw data records provided. Data is continuously monitored, recorded every five minutes, and aggregated daily and monthly. Data Source: Flow meter	Value is consistent with validated VCS PD. All raw data records were reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	Flow meter is calibrated once every three years. All calibration records were reviewed to ensure meter was operating accurately during reporting period. See Table 1 above for details.
WCH ₄	Raw data records provided. Data is continuously monitored, recorded every five minutes, and aggregated daily and monthly. Data Source: Methane analyzer	Value is consistent with validated VCS PD. All raw data records were reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	Methane analyzer is calibrated annually. All calibration records were reviewed to ensure analyzer was operating accurately during reporting period. See Table 1 above for details.
F _{CH₄,EL,y}	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
LFG _{Electricity}	Raw data records provided. Data is continuously monitored, recorded every five minutes, and aggregated daily and monthly. Data Source: Flow meter	Value is consistent with validated VCS PD. All raw data records were reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	Flow meter is calibrated once every three years. All calibration records were reviewed to ensure meter was operating accurately during reporting period. See Table 1 above for details.

Parameter	Documentation Provided	Appropriateness of Value	QA/QC Procedures applied
EC _{PJ,y}	Utility invoices provided. Data Source: Utility meter	Value is consistent with validated VCS PD. Utility invoice records reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	N/A – Utility invoices are based on a financial transaction meter. First Environment reviewed utility invoices to confirm values applied were consistent with source records.
PE _{propane}	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
PE _{diesel}	Raw data records and emission reduction calculations provided.	Value is consistent with validated VCS PD. Calculations were reviewed to confirm all formula and conversions were applied correctly to ensure accuracy of GHG emission reduction calculations.	N/A – not applicable for calculated value. First Environment confirmed that value was calculated correctly and consistent with procedures in the validated VCS PD.
FC _{propane}	Raw data purchase records and emission reduction calculations provided. Data Source: Purchase records	Value is consistent with validated VCS PD. Utility invoice records reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	N/A – Activity data based on purchase record. Entire quantity of fuel purchased is accounted for as project emissions. First Environment reviewed purchase records to confirm activity data applied was consistent with source records.

Parameter	Documentation Provided	Appropriateness of Value	QA/QC Procedures applied
FC _{diesel}	Raw data purchase records and emission reduction calculations provided. Data Source: Purchase records	Value is consistent with validated VCS PD. Utility invoice records reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	N/A – Activity data based on purchase record. Entire quantity of fuel purchased is accounted for as project emissions. First Environment reviewed purchase records to confirm activity data applied was consistent with source records.
T _{Flare}	Raw data records provided. Data is continuously monitored, recorded every five minutes, and aggregated daily and monthly.	Value is consistent with validated VCS PD. Raw data records reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	Flare thermocouple is inspected annually. All inspection records were reviewed to ensure thermocouple was operating accurately during reporting period. See Table 1 above for details.
E _{GenIngenco}	Raw data records provided. Data is continuously monitored, recorded hourly, and aggregated daily and monthly.	Value is consistent with validated VCS PD. Raw data records reviewed to trace data to its origin and to ensure accuracy for use in GHG emission reduction calculations.	Electricity meter is a financial transaction meter. See deviation in Section 3.3 above for detailed discussion.
Management of Henrico County Landfill	Landfill Permits, NMOC Emissions rate reports, and operating documentation provided.	Value is consistent with validated VCS PD.	N/A. Annual review of operating documentation conducted to ensure that management practices of the landfill have not changed.

The Audit Team performed an independent recalculation of the emission reductions from the verification period using the available raw data. Material misstatements were identified for correction by Anew as described in Section 2.5.

No material misstatements were observed in the final GHG assertion.

Overall, the GHG emission reductions were quantified correctly in accordance with the VCS PD and the ACM0001 methodology.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

Anew provided adequate documentation for the emission reduction calculations as well as its management systems around the data collection process. Specifically, First Environment was provided a Monitoring Report prepared in accordance with the VCS program template, transparent calculation spreadsheets, calibration records, and data records associated with landfill gas flow, methane concentration, fossil fuel, and electricity consumption.

The nature of all data records provided was documented objective evidence, which is a reliable data format for the determination of GHG emission reductions. A listing of final documents provided can be found in Appendix B.

Data was reviewed beginning from its original source of generation to confirm the accuracy of the information flow. Through raw data records review and knowledge of the projects data management systems, First Environment determined that the reliability of the evidence was sufficient for the determination of GHG emission reductions. The information flow from raw data output and recording to summary aggregation was verified and confirmed to be accurately represented in the final version of the Monitoring Report. The VCS PD adequately specifies appropriate calibration frequencies for all relevant monitoring equipment.

The evidence provided was consistent with the requirements of ACM0001 and the validated VCS PD and meets generally accepted evidentiary standards for best practice in GHG accounting.

4.6 Non-Permanence Risk Analysis

Not applicable.

5 VERIFICATION OPINION

First Environment was retained to provide verification services for the Henrico County Landfill Gas Combustion Project's GHG emission reductions assertion based on the following fundamentals:

- Level of assurance: Reasonable assurance.
- ISO Standard 14064-03: Specification with guidance for the verification and validation of greenhouse gas statements, 2019
- GHG Statement Responsible Party: Anew Carbon Development, LLC and Henrico County
- Objectives of verification: To assure project conformance with the VCS Standard, the CDM methodology ACM0001, and the VCS PD.
- Verification criteria: VCS Standard, the CDM methodology ACM0001, and the VCS PD.
- Definition of materiality: Misstatements of greater than five percent of the GHG assertion and qualitative non-conformities with the validated VCS PD are considered material.

- Scope, including:
 - Boundaries of the assertion: Springfield Road Landfill and Archaea Energy facility operations;
 - The physical infrastructure, facilities, and activities within the assertion: LFG collection and destruction operations;
 - GHG sources, sinks, and reservoirs included within the assertion: Methane emission reductions expressed as carbon dioxide-equivalents, carbon dioxide emissions from the operation of project equipment, methane emissions from pre-project destruction of landfill gas; methane emissions from flaring; and
 - The time period for the assertion: January 1, 2022 through December 31, 2022.

Based on the assessments performed and the historical evidence collected, First Environment concludes on January 24, 2024, with a reasonable level of assurance, that the emissions reductions of the Project resulting from the capture and combustion of methane gas are

- consistent with the VCS PD of August 28, 2020;
- in conformance with the VCS Standard, the CDM methodology ACM0001 (Version 19);
- without material discrepancy; and meeting the minimum level of accuracy of at least 95 percent.

Additionally, the deviations reviewed and approved during the current audit process are consistent with the VCS Standard and ACM0001 methodology, including all validation criteria therein.

Verification period: From 1-January-2022 to 31-December-2022.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2022 (01-January-2022-- 31-December-2022)	37,033	275	0	36,758
Total	37,033	275	0	36,758

Ex-ante GHG emission reductions and removals estimate during validation and compared to the actual achieved emissions reductions over the current reporting period are summarized in the table below:

Year	<i>Ex-ante emissions reductions /removals</i>	<i>Achieved emissions reductions /removals</i>	<i>Percent difference</i>	<i>Justification for the difference</i>
2022 (01-January- 2022-- 31- December-2022)	51,000	36,758	-27.9%	The landfill is closed and no longer active. Therefore, there is a variation in collected landfill gas flow and methane concentration from original PD projections.
Total	51,000	36,758	-27.9%	

APPENDIX A: RESOLUTION OF FINDINGS

ID	Corrective Action Request	Participant Response	Verification Conclusion
1	The following issues were identified with the Monitoring Report: a) The Monitoring Report applies an outdated version of the monitoring report template. b) Section 3 of the Monitoring Report does not identify previous project description deviations that are still applicable for the current reporting period (i.e. relative to the continuous methane analyzer replacement, methane density differences between the PD and what is applied in the calculations). c) Relative to the Sustainable Development Contributions discussion in Section 1.11, the "Contributions over Project Lifetime", are incorrect. d) Section 1.1 identifies an outdated reporting period and total emission reductions generated. e) Section 1.9 references an outdated version of the VCS Standard. f) Section 3.1 does not identify or discuss the Blue Source, LLC to Anew change, and relevant changes with the Project Proponent and Other Entities. g) Section 4.1 / Parameter Wch4 and Section 4.3 both contain artifactual discussion related to portable methane analyzer readings. h) Section 4.3 contains artifactual discussion relative to the 2021 reporting period that is not relevant to the current reporting period. i) Section 5.4 / Emissions reduction table date format is not consistent with the template instructions. j) Section 4.2 and Section 4.3, it is unclear in the monitoring report whether the backup portable gas analyzer (Elkin Earthworks Envision) was used during the reporting period.	The Monitoring Report was revised to correct each of the identified issues.	Response is acceptable.
2	Raw data (flow and methane) is not being applied in the emission reduction calculations. All data is being sourced from the monthly summary tabs of the data aggregation file which are based off of the "adjusted flow" tabs. The adjusted flow tabs have been altered by Draper Aden Associates for reporting requirements not related to VCS project activity. As a result, data validation checks and filters are not being applied to the raw data consistent with the requirements of the	The data analysis and calculations have been revised and are now correctly applying the raw data.	Response is acceptable.

ID	Corrective Action Request	Participant Response	Verification Conclusion
	validated PD (i.e., engine operability, flare temperature, low/high flare flow thresholds, etc.).		
3	The methane density value applied to the flare flow from January through July 2022 is incorrect.	The calculation workbook has been revised and now applies the correct methane density value for flare flow.	Response is acceptable.
4	The calculation of project emissions from purchased grid electricity applies an outdated eGrid electricity emission factor and transmission distribution loss (TDL) factor.	The calculation of project emissions from purchased grid electricity has been revised and now applies the most recent eGrid emission factor and transmission distribution loss factor (TDL).	Response is acceptable.
5	Per Table 7 of the VCS PD, the Ingenco electricity meter is to be calibrated every six months. Evidence of the electricity meter's calibration has not been provided.	This has been identified and justified as a project description deviation in the Monitoring Report.	Response is acceptable.
6	The Project Proponent (i.e., singular project proponent) identified in the Monitoring Report is not consistent with the Multiple Project Proponents identified in the VCS PD.	This has been identified and justified as a project description deviation in the Monitoring Report. Prior guidance from Verra stated that it was acceptable to move Archaea Energy (formerly Ingenco) to "Other Entities".	Response is acceptable.

ID	Clarification Request	Participant Response	Verification Conclusion
1	During the prior 2021 reporting period, the Siemens Ultramat gas analyzer failed due to moisture issues. Please clarify if the Siemens analyzer was repaired/calibrated by the manufacturer and/or a third party. If so, please provide the calibration and repair records and associated documentation.	The analyzer was repaired and calibrated by the manufacturer on September 30, 2021. The repair/calibration record has been provided.	Response is acceptable.

APPENDIX B: LIST OF DOCUMENTS

Final Versions of Documents Provided
Calculations
Henrico_calc_v2.0_01182024.xlsx
Data
Ingenco_Electricity Generated_LFG_2022_data_collection_2023_09_12.xlsx
Ingenco_LFG_2022_data_collection_2023_09_12.xlsx
Flare Operating Report 2002.xls
Flare Operating Report 2003.xls
Flare Operating Report 2004.xls
Amerigas 2022.pdf
S167215_HC_1.10.22.pdf
S190717_HC_4.12.22.pdf
S213654_HC_7.26.22.pdf
S224717_HC_9.14.22.pdf
Henrico_Dominion_2022.pdf
22 - 2022 Flow and Methane Data for GHG 2022 - bhh.xlsx
Henrico Raw Data 11222023.xlsx
Ingenco_Electricity Generated_LFG_2022_data_collection_2023_09_12.xlsx
RE_ Henrico LFG 2020 Offset Verification.pdf
Table 1A - 2022 Henrico Flare Temp and Flow Data - ddb.xlsx
22040100.CSV
22040200.CSV
22040300.CSV
22040400.CSV
22040500.CSV
22040600.CSV
22040700.CSV
22040900.CSV
22041000.CSV
22041100.CSV
22041200.CSV
22041300.CSV
22041400.CSV
22041500.CSV
22041600.CSV
22041700.CSV

22041800.CSV
22041900.CSV
22042000.CSV
22042100.CSV
22042200.CSV
22042300.CSV
22042400.CSV
22042500.CSV
22042600.CSV
22042700.CSV
22042800.CSV
22042900.CSV
22043000.CSV
21123100.CSV
22010100.CSV
22010200.CSV
22010300.CSV
22010400.CSV
22010500.CSV
22010600.CSV
22010700.CSV
22010800.CSV
22010900.CSV
22011000.CSV
22011100.CSV
22011200.CSV
22011300.CSV
22011400.CSV
22011500.CSV
22011600.CSV
22011700.CSV
22011800.CSV
22011900.CSV
22012000.CSV
22012100.CSV
22012200.CSV
22012300.CSV
22012400.CSV
22012500.CSV
22012600.CSV
22012700.CSV

22012800.CSV
22012900.CSV
22013000.CSV
22013100.CSV
22020100.CSV
22060100.CSV
22060200.CSV
22060300.CSV
22060400.CSV
22060500.CSV
22060600.CSV
22060700.CSV
22060800.CSV
22060900.CSV
22061000.CSV
22061100.CSV
22061200.CSV
22061300.CSV
22061400.CSV
22061500.CSV
22061600.CSV
22061700.CSV
22061800.CSV
22061900.CSV
22062000.CSV
22062100.CSV
22062200.CSV
22062300.CSV
22062400.CSV
22062500.CSV
22062600.CSV
22062700.CSV
22062800.CSV
22062900.CSV
22063000.CSV
22110100.CSV
22110200.CSV
22110300.CSV
22110400.CSV
22110500.CSV
22110600.CSV

22110700.CSV
22110800.CSV
22110900.CSV
22111000.CSV
22111100.CSV
22111200.CSV
22111300.CSV
22111400.CSV
22111500.CSV
22111600.CSV
22111700.CSV
22111800.CSV
22111900.CSV
22112000.CSV
22112100.CSV
22112200.CSV
22112300.CSV
22112400.CSV
22112500.CSV
22112600.CSV
22112700.CSV
22112800.CSV
22112900.CSV
22113000.CSV
Other
Henrico Attestation GHG Program 2.0 Signed.docx
16 0628 - Title V Revocation.pdf
RPT - 13 1228 - Springfield Road Landfill - 5 - Year NMOC Emissions Report.pdf
Monitoring
22 0504 - Gas analyzer - ENV 1701204 Annual Calibration report - DDB.pdf
22 0629 - ALL Device Certifications (Emerson).pdf
22 0727 - JULY IMM - JBR (calibrate Siemens) 5.pdf
2021 Siemens Gas Analyzer Repair Report.pdf
RE EXTERNAL RE Henrico LFG Project (2022 Ingenco Data needed).msg
Henrico 2022 vcs-monitoring-report-template-v4.2-final V2.0_01192024.docx
Henrico 2022 vcs-monitoring-report-template-v4.2-final 1.1 11222023.docx
21778-127HBB - HENRICO CO LF GAS MAP - all wells 2019.pdf

HC FIT-408 Calibration Sheet (2021-12-10).pdf
HC FIT-408 Calibration Sheet (2023-01-09).pdf