

Verification Report for Rochelle Municipal Landfill

CAR1372

December 2019

**Prepared for: Element Markets Renewable Energy, LLC
3555 Timmons Lane, Suite 900
Houston, Texas 77027**

**Prepared by: First Environment, Inc.
79 Madison Avenue, 2nd Floor
New York, NY 10016**



TABLE OF CONTENTS

1.	Introduction	1
2.	Objectives	1
3.	Verification Scope	1
4.	Standards Used to Verify Emissions (Criteria).....	1
5.	Overview of the Verification Process	2
5.1	Conflict of Interest Review	2
5.2	Verification Team.....	2
5.3	Verification Kick-off	3
5.4	Development of the Verification Plan	3
5.5	Site Visit.....	3
5.6	Emissions Reduction Data and Calculation Assessment	3
5.7	Corrective Actions and Supplemental Information.....	3
5.8	Verification Reporting.....	3
6.	Site's Conformance with Verification Criteria.....	3
6.1	Project Description.....	3
6.2	Eligibility.....	4
6.2.1	Ownership and Title.....	4
6.2.2	Project Start Date	4
6.2.3	Additionality	4
6.2.3.1	Performance Standard Test.....	4
6.2.3.2	Legal Requirements Test.....	5
6.2.4	Regulatory Compliance.....	5
6.3	Project Performance Against CAR Protocol and Project Management System	6
6.3.1	Project Monitoring	6
6.3.2	Instrument Quality Assurance/Quality Control.....	7
6.3.3	Project Emissions	7
6.4	Emissions Reduction Calculation Assessment.....	8
6.5	Approved Variance or Deviations.....	9
7.	Verification Conclusion	10
8.	Lead Verifier Signature.....	10
9.	Senior Internal Reviewer Signature	10

TABLES

TABLE 1: Monitoring Equipment	7
TABLE 2: Project Emissions	7
TABLE 3: Input Parameters	8
TABLE 4: Assessment of Variance Requirements	9

1. Introduction

This report is provided to the Project Developer, Element Markets Emissions, LLC (Element Markets), as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Rochelle Municipal Landfill – CAR1372 (the Project) for the period from January 1, 2018 through December 31, 2018.

The Project was previously listed and registered under the Verified Carbon Standard (VCS ID 942), and was previously verified under the VCS program for a reporting period of February 9, 2011 to February 29, 2012. The Project has since been transferred to the Climate Action Reserve, and is considered a pre-existing project as defined in Section 2.4.3 Paragraph 2a of the Program Manual. A Zero-Credit Reporting Period Acknowledgment and Election form was filed for the period of March 1, 2012 through December 31, 2017, and was subsequently approved in a determination issued by CAR on January 9, 2020. First Environment reviewed the Monitoring Report for the zero-credit period and based on the information contained within, First Environment is reasonably assured that project emissions were less than baseline emissions during the zero-crediting period.

2. Objectives

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 eligibility requirements, discussed in Section 4 of this report; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

3. Verification Scope

Specific scope metrics for the verification are outlined in the table below:

Geographic Boundaries	Rochelle Municipal Landfill, Rochelle, Illinois
Emission Reduction Sources, Project Emissions, and Greenhouse Gases	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO ₂ e)) resulting from methane destruction; Project emissions of CO ₂ from fossil fuel combustion and purchased electricity.
Reporting Period	January 1, 2018 through December 31, 2018
Data Sources	Metered Data and Emissions Reduction Calculations

4. Standards Used to Verify Emissions (Criteria)

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

Standard of Verification	• Climate Action Reserve Landfill Project Protocol, Version 5.0, April 24, 2019 (CAR Protocol) • Climate Action Reserve Offset Program Manual, November 12, 2019 • Applicable Climate Action Reserve Policy Memos
Verification Process	• Section 8 of the CAR Protocol • Climate Action Reserve Verification Program Manual, February 8, 2017 • ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006
Level of Assurance	• Reasonable assurance
Materiality	• Misstatements greater than three percent of the Project's emission reductions assertion are considered material • Qualitative non-conformities with the CAR Protocol are also considered material

5. Overview of the Verification Process

The verification process was utilized to gain an understanding of the Project's 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.

The following verification process was used:

- conflict of interest review;
- selection of Verification Team;
- initial interaction and kickoff meeting with Element Markets;
- development of the verification and sampling plan;
- review of management and data collection system;
- site visit;
- assessment of raw data and calculations for period under review;
- follow-up interaction with Element Markets for corrective action, clarification, or supplemental data as needed; and
- final statement and report submittal.

5.1 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. First Environment received authorization to proceed with verification activities for the project developer from CAR in a notification dated August 5, 2019.

5.2 Verification Team

First Environment's Verification Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with landfill operations.

Lead Verifier – Jeff Daley

Senior Internal Reviewer – Michael Carim

5.3 Verification Kick-off

The verification was initiated with a kick-off meeting on August 8, 2019 with Element Markets and Evensol, LLC. The meeting focused on confirming the scope, schedule, and data required for verification.

5.4 Development of the Verification Plan

The Verification Team formally documented its verification plan as well as determined the data-sampling plan. The verification plan was developed based on the discussion of key elements of the project verification process during the kick-off meeting. The project developer was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with the project developer, the plan identified the First Environment project team members, project level of assurance, materiality threshold, and standards of evaluation and reporting for the verification. It also provided an outline of the verification process and established project deliverables. A separate data-sampling plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

5.5 Site Visit

Mr. Jeff Daley conducted a site visit on August 16, 2019 to assess the Project's data management systems and interview personnel relevant to the Project for the verification period.

5.6 Emissions Reduction Data and Calculation Assessment

This assessment used information and insights gained during the previous steps to evaluate the collected data and the reported emissions reduction quantities, and identify if either contained material or immaterial misstatements.

5.7 Corrective Actions and Supplemental Information

The team issued corrective action requests and clarification requests during the verification process. Element Markets provided sufficient responses to all corrective action and clarification requests.

5.8 Verification Reporting

Verification reporting, represented by this report, documents the verification process and identifies its findings and results. Verification reporting consists of this report for Element Markets, a verification statement, and a list of findings, all to be submitted to the Climate Action Reserve.

6. Site's Conformance with Verification Criteria

6.1 Project Description

The Rochelle Municipal Landfill is located in Rochelle, Illinois and is owned by Rochelle Waste Disposal. The landfill opened in 1973 and currently receives municipal solid waste.

The Project consists of the voluntary collection and destruction of landfill gas in three Caterpillar 3520C Gensets. The Landfill consists of Units 1-3, all of which are separate units from each

other and consist of geomembrane liners which prevent the migration of gas between units. The Project landfill gas (LFG) well field and active gas collection and control system installation was completed in 2009, and currently captures gas from all landfill Units for destruction in the engines or flare. Destruction of Unit #2 and Unit#3 gas in the flare is not being claimed during the current reporting period. Prior to this system, LFG was collected and flared from Unit 1 only. Because LFG from Unit 1 was destroyed prior to the Project activity, LFG methane flow from Unit 1 is deducted from the overall quantity of LFG methane flow collected to obtain the quantity of Project eligible methane flow. The Project destroys landfill gas that otherwise would be vented to the atmosphere, resulting in a net reduction of CO₂-equivalents. The baseline scenario is defined as the installation of a new gas collection system on physically-distinct cells where neither gas collection nor destruction has previously occurred.

6.2 Eligibility

The Project meets the eligibility requirements set forth in the CAR Protocol, as described below.

6.2.1 Ownership and Title

Rochelle Waste Disposal (an entity owned by the City of Rochelle) is the owner of the landfill. JL Evensol, LLC is the current owner/operator of the energy plant (which was previously owned by Rochelle Energy Center, LLC a subsidiary of William Charles Energy, LLC). First Environment reviewed four affidavits signed by each party (i.e. Rochelle Waste Disposal, the City of Rochelle, William Charles Energy, and JL Evensol) all of which identify and confirm that JL Evensol retains ownership of the emission reduction credits associated the destruction of landfill gas from the landfill. JL Evensol then entered into an agreement with Element Markets Emissions, LLC selling ownership of the carbon credits to Element Markets Emissions, LLC. These documents reasonably establish transfer of ownership from all involved entities to Element Markets Emissions, LLC. The ownership status was also confirmed at the site visit.

Additionally, First Environment relied on the Attestation of Title completed by Element Markets for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.2 Project Start Date

First Environment confirmed that the Project meets CAR's start date requirements. The Project start date is June 12, 2009 which was confirmed through review of the Illinois Environmental Protection Agency (IEPA) approval of the Landfill Operating Permit modification which allowed the Unit #2 Gas Collection Control System (GCCS) to begin operation to collect and destroy methane, and, therefore, the identified start date is within 90 days of first flow of landfill gas from Unit #2.

6.2.3 Additionality

The Project passes both the Performance Standard Test and the Legal Requirements Test, as described below.

6.2.3.1 Performance Standard Test

The Project consists of the installation of a new gas collection system on physically-distinct cells where neither gas collection nor destruction has previously occurred, and therefore exceeds the performance standard defined by the CAR Protocol, specifically Scenario 4 from the list provided in Section 3.4.1 of the CAR Protocol. The landfill previously collected and destroyed

LFG in an open flare from Unit 1. It was also confirmed during the site visit that the landfill does not add any liquid other than leachate into the waste mass in a controlled manner. Therefore, the landfill is not a bioreactor.

6.2.3.2 Legal Requirements Test

The landfill has a permitted capacity above the 2.5 million cubic meter threshold of municipal solid waste that triggers New Source Performance Standard (NSPS) requirements. As such, the most recent non-methane organic compounds (NMOC) emissions rate testing occurred on February 13, 2018. The landfill has not been modified or re-constructed since July 17, 2014; therefore, the emissions rate report dated May 1, 2018 was prepared in accordance with 40CFR60, Subpart WWW. The report identifies that the NMOC emission rate is estimated to be 30.93 Megagrams (Mg) per year in 2018, which is below the 50 Mg per year threshold established by the NSPS regulation. Therefore, the landfill is not required to operate an active collection system under NSPS requirements.

First Environment also confirmed, through interviews with project personnel during the site visit, that no additional state or local requirements mandate the Project activity. Additionally, First Environment reviewed the facility's solid waste operating permit and applicable Title V permits to confirm that no other requirements for an active landfill gas collection and control system existed. This cursory review of permits, laws, and regulations indicated the voluntary nature of the Project.

Additionally, First Environment relied on the Attestation of Voluntary Implementation completed by Element Markets for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.4 Regulatory Compliance

First Environment reviewed the landfill's Solid Waste Permit, Title V Permit, and the energy plant's Title V Permit, and Waste Water Permit, as well as performed interviews with site personnel to determine regulatory compliance. First Environment generated compliance reports for both the landfill and energy plant on August 8, 2019 using the Environmental Protection Agency's (EPA) Enforcement and Compliance History Online (ECHO) database. The ECHO database identified the following issues:

- Landfill: The ECHO report identified Clean Water Act (CWA), Discharge Monitoring Report (DMR), and Storm Water Pollution Prevention Plan (SWPPP) issues. These issues are related to 1) Effluent limit exceedances in storm water discharge, 2) Late submittal of Discharge Monitoring Reports, and 3) Late submittal of Storm Water Pollution Prevention Plan (SWPPP) routine inspection reports. The effluent limit exceedances are reported via DMR's which have been provided for review. These exceedances are not related to the Project activity or any of the Project equipment. All relevant 2018 DMR's and SWPPP inspection reports have been provided to demonstrate that these reports were in fact generated and reported. First Environment reviewed all relevant documents and confirmed that the effluent limit exceedances are not related to the Project activity, and that the late submittals of SWPPP and DMR reports are administrative in nature.
- Energy Facility: The ECHO report identified a Title V / SO₂ issue due to a stack test event from April 18, 2018, and Title V Compliance Certification issues which were listed

in the database on February 13, 2018. The facility surpassed its annual SO₂ emission limit in May of 2018, and the 92% threshold of the 90 ton limit was exceeded in April 2018 (Identified in ECHO Report as 04/18/2018 failed stack test). These issues are all a result of a formal notice that was issued by IEPA on September 27, 2017 identifying exceedances with a sulfur recovery unit located at the facility. The Title V annual compliance certification (TV ACC) issues flagged are all related to this same SO₂ emissions issue. The SO₂ emission limits were a known issue that was being addressed with a permit modification which was approved by IEPA on July 10, 2018. The SO₂ issue was caused by an increase in H₂S levels coming from the landfill waste, and was addressed by modifying the energy plants' Title V permit to better reflect increased emission limits which the landfill had previously been granted in their Title V Permit. The energy facility is identified as a single source with the landfill, so it was an administrative error that the landfill had received an increased emission limit in their Title V Permit, and the energy facility had not received a similar emissions limit increase in their Title V Permit. First Environment did not identify any evidence that the Project is or was in a state of recurrent non-compliance or non-compliance as a result of negligence or intent and confirmed that the H₂S exceedances are not directly related to the Project activity.

- Energy facility: Rochelle Municipal Utilities issued a Notice of Violation (NOV) on January 17, 2018 relevant to the facilities' wastewater discharge permit. The NOV identifies that wastewater testing from August 22, 2017 and November 20, 2017 showed exceedances of phenols. The facility responded to the issue in a letter dated February 15, 2018 and which identifies that the phenol exceedance issue is also related to the SO₂ issue discussed above. Subsequent waste water discharge testing occurred in August 2018 to demonstrate the phenol levels were acceptable and no further action has been taken by Rochelle Municipal Utilities. First Environment reviewed the relevant documentation and confirmed that the exceedances are not directly related to the project activity.

No other evidence of noncompliance was identified during the reporting period.

Additionally, First Environment relied on the Attestation of Regulatory Compliance completed by Element Markets for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.3 Project Performance Against CAR Protocol and Project Management System

The Project was implemented in conformity with the CAR Protocol except where identified below. Element Markets developed and implemented a Monitoring Plan to track relevant project parameters and data sources. The Monitoring Plan, including the Project Diagram, was reviewed to determine compliance with the protocol requirements. Based on observations made during the site visit and review of relevant project documentation, First Environment found the Monitoring Plan and Project Diagram to meet the requirements set forth by the CAR Protocol and the Project to be implemented in accordance with the Monitoring Plan.

6.3.1 Project Monitoring

The Project's monitoring conforms to the requirements of the CAR Protocol, as discussed below.

Landfill gas flow to the engines is continuously measured using a single flow meter assembly consisting of a Veris Verabar in conjunction with Rosemount Model 2051 and Rosemount Model 3051 pressure transmitters. The flow rate is standardized from ambient conditions to a standard temperature and pressure of 68°F and one atmosphere.

Methane concentration of the landfill gas is measured continuously using a Siemens Ultramat 23 Continuous Gas Analyzer.

Both gas flow rates and methane concentration are measured on the same relative moisture basis.

Each engine is equipped with a safety shut off valve that prevents biogas flow to the destruction devices when not operational.

A SCADA system records the flow rate, and methane concentration data at least once every 15 minutes.

Table 1 summarizes the Project monitoring system parameters and monitoring equipment employed by the Project.

TABLE 1: Monitoring Equipment

Parameter	Monitoring Equipment	Frequency of Measurement	Frequency of Recording	Recording Device
Landfill gas flow	Veris Verabar / Rosemount pressure transmitters	Continuous	At least every 15 minutes	SCADA System
Methane Concentration	Siemens Ultramat 23 Continuous Gas Analyzer	Continuous	At least every 15 minutes	SCADA System
Hourly Operation of Destruction Device	Each engine is equipped with safety shut off device that prevents biogas flow to the destruction device when the destruction device is not operational.			

6.3.2 Instrument Quality Assurance/Quality Control

During the reporting period, both the flow meter and continuous methane analyzer were not maintained in accordance with the QA/QC requirements identified in Section 6.2 of the Protocol. Therefore, Element Markets requested a monitoring variance as discussed in Section 6.5 below.

6.3.3 Project Emissions

Project emissions sources and the associated monitoring methodology are summarized in Table 2.

TABLE 2: Project Emissions

Project Emissions Source	Monitoring
Consumption of Purchased Electricity to power the Project equipment	Monthly electrical utility bills

6.4 Emissions Reduction Calculation Assessment

The emission reduction calculations were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. The formulas were tested to ensure consistency with the calculation methodology described in the CAR Protocol.

Total landfill gas flow is computed by multiplying the average landfill gas flow rate in a given interval by the length of the interval. Flow totals are aggregated on a daily basis. Metered gas flow volumes are recorded at standard conditions of one atmosphere of pressure and a temperature of 68°F by the flow meter, and are then adjusted in the emission reduction calculations to a standard condition of one atmosphere of pressure and a temperature of 60°F. The total volume of methane destroyed by the Project was computed in daily intervals by multiplying the daily gas flow to the engines by the daily average of methane concentration measurements and is converted to a mass flow using the density of methane at 60°F and one atmosphere of pressure. Because the total quantity of flow to the engines includes flow from the ineligible pre-project Unit 1 area, methane flow from Unit 1 was deducted from the total methane flow. Individual metering of Unit 1 methane flow was not available for the current reporting period. Therefore, Element Markets requested a monitoring variance for the Unit 1 pre-project deduction as discussed in Section 6.5 below. The total quantity of eligible quantity of methane destroyed by the Project is aggregated monthly and summed over the reporting period to obtain the total baseline emissions. Project emissions were calculated by multiplying activity data by appropriate emission factors. Because one flow meter is monitoring flow to all three engines, it was confirmed through review of the raw flow data that during any intervals when one or more engines was not operational, the remaining engines had the available capacity to destroy all of the available landfill gas. Additionally, it was confirmed during the site visit that the engines are designed in such a manner that it is physically impossible for gas to pass through while the engine(s) are non-operational and that each engine is equipped with an automatic safety shut-off valve. No data substitution was performed during the current reporting period. The total emission reductions were determined by subtracting the Project emissions from the baseline emissions.

Table 3 summarizes the input parameters used in the emission reduction calculations.

TABLE 3: Input Parameters

Input Parameter	Name	Description/ Value
$LFG_{i,t}$	Total quantity of LFG	Aggregated daily from metered data, recorded at 68°F and one atmosphere of pressure
$PR_{CH_4,t}$	Methane content	Averaged daily from continuous data
DE_i	Default destruction efficiency	93.6% (Lean-burn Internal Combustion Engine)
OX	Oxidation Factor	10%
DF	Discount Factor	0%
EF_{EL}	Purchased electricity emission factor	1,243.4 lb. CO ₂ /MWh (RFCW eGrid Region)
GWP_{CH_4}	Global Warming Potential of Methane	25 (IPCC 4 th Assessment Report)

Copies of the raw data used in the calculations, including flow data and methane content data, were compared with the data used in the final calculations and tested for transcription or mathematical errors. A representative sample of raw data sources and calculations over the verification period were reviewed. First Environment performed recalculations of emission reductions for the entire reporting period to assess whether they were free of material misstatement. First Environment found the emission reduction calculations to be free of material misstatement.

6.5 Approved Variance or Deviations

As noted above, Element Markets requested variances from the CAR Protocol for the current reporting period. The variance requests were approved by CAR in on December 3, 2019 for the period of January 1, 2018 through December 31, 2019. Table 4 summarizes the specific conditions of each variance approval and First Environment's verification conclusion.

TABLE 4: Assessment of Variance Requirements

Variance 1 Requirements	Verification Conclusion
The verifier checks the records of June 2019 QA/QC activities performed by PASS II, LLC, and confirms they demonstrate the meters were within +/- 5% drift, and that there were no other signs of meter malfunction or damage exhibited at the time of such checks.	First Environment reviewed calibration records dated June 5, 2019 for both the flow meter and continuous methane analyzer, both of which identified the meters were operating well within the +/-5% drift threshold. The calibration records did not identify any other signs of meter malfunction or damage.
The verifier confirms the methane analyzer has an auto calibration function, which appears to be functioning as designed.	First Environment confirmed during the site visit that the gas analyzer has an auto calibration function. First Environment did not observe any evidence to suggest that the auto calibration was not functioning as designed.
The verifier confirms flow meter manufacturer recommendations that the flow meters need not be factory calibrated.	First Environment reviewed the applicable flow meter manuals and did not identify any requirements or recommendations that would suggest that the meters must be factory calibrated.
The verifier confirms the project's monitoring plan has been updated to ensure the project meets protocol QA/QC requirements going forward.	Sections 4.4.2 and 4.4.3 of the Monitoring Plan identify QA/QC practices that are consistent with the Protocol requirements.
Variance 2 Requirements	Verification Conclusion
The verifier confirms that Unit 1 is a closed cell, that Unit 1 has not been converted into a bioreactor, and that there are no other conditions present that appear to make it unreasonable to assume that 2011 Unit 1 flow is likely to be higher than contemporary Unit 1 flows.	First Environment confirmed during the site visit that Unit 1 is not a bioreactor, and is a separate closed area separated by a road and a geomembrane liner which prevents the migration of gas between units. No other conditions were identified that make it unreasonable to assume that 2011 Unit 1 flow is likely to be higher than contemporary Unit 1 flows.

Variance 1 Requirements	Verification Conclusion
The verifier confirms that the monitoring plan has been updated to ensure contemporaneous Unit 1 flow data will be captured for future reporting periods.	Section 5.1.3 of the Monitoring Plan has been updated to identify that contemporaneous Unit 1 flow data will be captured for future reporting periods, starting in 2020.

7. Verification Conclusion

Based on the evidence collected and the assessments performed, First Environment concludes that the Project's GHG emissions reductions achieved through the collection and combustion of landfill gas for the period January 1, 2018 through December 31, 2018 can be considered with a reasonable level of assurance:

- in conformance with the verification criteria, and
- without material discrepancy.

Verified results show:

January 1 to December 31, 2018	Total
Baseline Emissions (tCO ₂ e)	62,464
Project Emissions (tCO ₂ e)	22
Emissions Reductions (tCO ₂ e)	62,442

8. Lead Verifier Signature



Jeff Daley
Environmental Specialist

9. Senior Internal Reviewer Signature



Michael Carim
Senior Associate