

# **Verification Report for Therm Solutions, Inc.**

## **American Carbon Registry**

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**Prepared by: First Environment, Inc.  
10 Park Place  
Building 1A, Suite 504  
Butler, New Jersey 07405**



## TABLE OF CONTENTS

1. Introduction .....	1
2. Objectives .....	1
3. Verification Scope .....	1
4. Verification Criteria.....	2
5. Overview of the Verification Process.....	2
5.1 Conflict of Interest Review .....	3
5.2 Audit Team .....	3
5.3 Audit Kick-off.....	3
5.4 Development of the Verification Plan .....	3
5.5 Site Visit.....	3
5.6 Emissions Reduction Data and Calculation Assessment .....	4
5.7 Corrective Actions and Supplemental Information.....	4
5.8 Verification Reporting.....	4
6. Project Conformance with Verification Criteria .....	4
6.1 Project Eligibility.....	4
6.2 Offset Title .....	4
6.3 Regulatory Compliance.....	4
6.4 Project Monitoring and Management System.....	5
6.5 Monitoring Instrument QA/QC.....	5
7. Verification Results.....	6
7.1 GHG Information Verified.....	6
7.2 Verification Assessment Techniques and Processes Employed.....	6
8. Audit Results.....	7
9. Verification Conclusion.....	7
10. Lead Verifier Signature .....	8
11. Independent Reviewer Signature .....	8
APPENDIX A – Verification Findings.....	9

**TABLES**

TABLE 1: Parameters Monitored..... 5

# 1. Introduction

First Environment, Inc. (First Environment) provides this verification report to Therm Solutions, Inc. (Therm) as a deliverable of the American Carbon Registry (ACR) project verification process. It covers the verification of the following Project and reporting period:

Project Name	ACR Project ID	Reporting Period
Advanced Refrigeration - ARS2020002	ACR791	January 16, 2020 – October 22, 2020

The Project reports emission reductions for a single 10-year crediting period beginning on January 16, 2020.

Four supermarket locations in California (Raley's Sacramento, and Grocery Outlet stores in East Sacramento, Dixon, and Canoga Park) utilize Large Commercial Refrigeration units, an eligible Refrigerant Sector and Segment under the Methodology. The Project consists of the transition from high global warming potential (GWP) refrigerants to a low-GWP refrigerant in these refrigeration systems. The Raley's Sacramento location employs a cascade system that utilizes R-744 (carbon dioxide) and R-717 (ammonia) as the low-GWP refrigerants in the rack system. The Grocery Outlet location in East Sacramento uses R-744 in a rack system. The Dixon and Canoga Park Grocery Outlet locations consist of micro-distributed, stand-alone systems<sup>1</sup> that utilize R-290 (Propane) as the low-GWP refrigerant. The transition to a low-GWP refrigerant results in a net reduction in greenhouse gas (GHG) emissions over the lifetime of the refrigeration systems.

The GHG Project Plan provides additional details about the Project.

# 2. Objectives

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

- the objectives of the ACR Validation and Verification Standard Chapter 8.B are met;
- the Project conforms to the requirements of the verification criteria 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 for each project are outlined in the table below:

<b>Geographic Boundaries</b>	Supermarkets located in: <ul style="list-style-type: none"> <li>• East Sacramento, CA</li> <li>• Sacramento, CA</li> <li>• Dixon, CA</li> <li>• Canoga Park, CA</li> </ul>
<b>Greenhouse Gases Verified</b>	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO <sub>2</sub> -e) resulting from refrigerant

<sup>1</sup> For the purposes of determining the baseline scenario, ACR has confirmed that micro-distributed systems can be treated as Large Commercial Refrigeration systems.

	replacement; Project emissions from use of eligible refrigerants R-290 (propane) or R-744 (carbon dioxide) and R-717 (ammonia)
<b>Reporting Period</b>	1/16/2020 – 10/22/2020
<b>Data Sources</b>	Refrigeration systems specifications; contractor installation records; refrigerant purchase records
<b>Level of Assurance</b>	Reasonable assurance
<b>Definition of Materiality</b>	Misstatements greater than five percent of the emission reductions assertion in the reporting period were considered material. Qualitative non-conformities with and discrepancies in the GHG Project Plan and Monitoring Report between the validation and verification criteria were also considered material.

## 4. Verification Criteria

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

<b>Standards of Verification</b>	<ul style="list-style-type: none"> <li>• ACR Standard, Version 7.0, December 2020 (ACR Standard)</li> <li>• Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, Version 2.1 (the Methodology), including Errata and Clarification issued August 13, 2021</li> <li>• GHG Project Plan, Revision 7 dated September 2022</li> </ul>
<b>Verification Process</b>	<ul style="list-style-type: none"> <li>• ACR Validation and Verification Standard, Version 1.1, May 2018</li> <li>• ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006</li> </ul>

The ACR Monitoring Report prepared by Therm for the reporting period was also used to inform the criteria applied to the verification process.

## 5. Overview of the Verification Process

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

- conflict of interest review;
- selection of Audit Team;
- initial interaction and kickoff meeting with primary Therm contact;
- development of the verification plan and sampling plan;
- site visits;
- review and evaluation of GHG information systems and data;
- follow-up interaction with Therm contact for corrective action or supplemental data as needed; and
- final statement and report development.

The verification process was utilized to gain an understanding of the Project's emission sources and reductions, 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.

### **5.1 Conflict of Interest Review**

Prior to beginning any third-party assessment, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the engagement. No potential conflicts were found for the Project. A project-specific conflict of interest form was also filed with the ACR for the Project.

### **5.2 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 industrial gas operations:

Lead Verifier – Michael Carim  
Verifier – Logan Simpson  
Independent Reviewer – James Wintergreen

### **5.3 Audit Kick-off**

The audit process was initiated with a kick-off conference call on August 11, 2022 with the primary Therm contact. The meeting focused on confirming the audit scope, objectives, criteria, schedule, and the information required for the verification process.

### **5.4 Development of the Verification Plan**

The 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 verification process during the kick-off meeting. Therm was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with Therm, 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. Michael Carim performed site visits on September 1, 2022 at the Raley's Sacramento and Grocery Outlet Dixon supermarkets. The site visits included interviews with key personnel and facility tours to assess GHG project boundaries, site operations, data collection processes, and information management systems. Key Therm and store personnel interviewed during the site visit included:

- Olivia Bonnes
- Taylormarie Aston
- Chris Moniz
- Joe Bruch

First Environment's risk assessment determined that the site visits performed at the Sacramento and Dixon, California locations were sufficient to meet sampling requirements for on-site inspection in the Aggregated Project.

## **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 Audit Team made requests for corrective action and clarification during the verification process. Therm provided sufficient responses to all requests. These requests and Therm's responses are described in Appendix A of this report.

## **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 Therm, along with a verification statement. Both the report and statement are submitted to ACR as part of the verification reporting process.

# **6. Project Conformance with Verification Criteria**

## **6.1 Project Eligibility**

First Environment completed the validation of the Project's GHG Project Plan in September 2022. This demonstrates that the Project is eligible under the Methodology.

The Project does not currently participate in any other GHG emission trading or compliance programme and has not previously been rejected by another GHG programme.

## **6.2 Offset Title**

Therm retains rights to GHG emission reductions associated with the refrigerant transition through agreements with supermarkets where advanced refrigeration systems are installed. Based upon the review of these agreements, First Environment concluded that Therm holds title to emission reduction credits associated with the Project.

## **6.3 Regulatory Compliance**

Therm provided the required regulatory attestation to First Environment during the verification process. The attestation confirmed that the Project complied with all laws and regulations for the duration of the reporting period and did not disclose any violations.

First Environment performed a check of the US EPA's ECHO database for the supermarket facilities within the scope of the verification to further inform the regulatory compliance assessment. Database search results for the facilities did not identify any violations or instances of non-compliance during the reporting period at the Raley's Sacramento location. Database queries for other grocery store locations within the project boundary did not return any result.

## 6.4 Project Monitoring and Management System

The Project was implemented in conformity with the GHG Project Plan. The primary parameters monitored, and their associated monitoring methodologies, are presented in Table 1 below.

**TABLE 1: Parameters Monitored**

Monitoring Parameter	Method of Estimation	Frequency of Measurement	Unit of Measurement	Frequency of Recording
Quantity of refrigerant used in the baseline system ( $Q_{BR,j,i}$ )	Manufacturer's specifications and Table 4 of Methodology	Once at installation	Kilograms	Once at installation
Quantity of alternative refrigerant used in the project system ( $AR_{k,i}$ )	Contractor installation records and refrigerant purchase records	Once at installation	Kilograms	Once at installation
Annual amortized emission rate of refrigerant in baseline system ( $ER_{REF,j}$ )	Table 4 of Methodology	Once at validation	Percentage	Once
Annual emission rate of alternative refrigerant in project system ( $ER_{REF,k}$ )	Set equal to emission rate of baseline system	Once at validation	Percentage	Once
GWP of the baseline refrigerant ( $GWP_{REF,j}$ )	Table 6 of Methodology	Once at validation	Dimensionless	Once
GWP of alternative refrigerant used in project system ( $GWP_{REF,k}$ )	Table 3 of Methodology	Once at validation	Dimensionless	Once

The Monitoring Report includes complete descriptions of the frequency, responsibility, and procedures for recording, storing, monitoring, and measuring all input parameters for required emission reduction quantification. The monitoring procedures described in the Monitoring Report and implemented on-site are consistent with Section D of the GHG Project Plan and address all relevant monitoring requirements in the Methodology. The adequacy of the data management systems described in the monitoring plan was assessed during the site visit conducted prior to assessment activities and through interviews with individuals holding responsibility for carrying out Project monitoring and data reporting.

## 6.5 Monitoring Instrument QA/QC

The Monitoring Report describes QA/QC procedures for data that meet the requirements of the Methodology. Specifically, design specifications and service records can be cross-referenced with installed equipment at supermarkets to confirm reported activity data; however, due to the reliability of manufacturer's equipment specifications and vendor service records, minimal data uncertainty is foreseen.



## 7. Verification Results

During the verification process, First Environment reviewed the Project's Monitoring Report, GHG emission reduction assertions, and supporting documentation for the current reporting period to ensure consistency with the GHG Project Plan and the Methodology. Discrepancies between Project documentation and the verification criteria were considered material and identified for corrective action. Additionally, First Environment assessed the GHG emission reduction assertions and underlying monitored data to determine if either contained material or immaterial misstatements. The results of these assessments are discussed in greater detail below.

### 7.1 GHG Information Verified

Emission reduction calculations were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. Formulae were tested to ensure they were consistent with the calculation methodology described in the Methodology and GHG Project Plan. Total baseline emissions were quantified in accordance with Equation 1 from the Methodology.

The quantity of refrigerant used in the baseline system ( $Q_{BR,j,i}$ ) was determined from manufacturer's specifications and design records for the refrigeration system installed at each supermarket. The total cooling capacity of each system is multiplied by the default charge size specified in Table 4 of the Methodology to calculate total system charge in the baseline scenario.

The annual amortized emission rate of the baseline refrigerants ( $ERA_{REF,j}$ ) was correctly selected from Table 4 of the Methodology based on refrigerant segment type. The GWP of the baseline refrigerant blend ( $GWP_{REF,j}$ ) was determined from Table 6 of the Methodology.

Project emissions associated with equipment operation and disposal were quantified using Equation 2 from the Methodology. The quantity of alternative refrigerant used in the project system was determined from service records provided by the contractor who charged the system. For the Raley's Sacramento store, the quantity of alternative refrigerant used was determined from material purchase records.

The annual amortized emission rate of the alternative refrigerants ( $ERA_{REF,k}$ ) was set equal to the emission rate of the baseline refrigerants and the GWP of alternative refrigerant ( $GWP_{REF,k}$ ) was correctly selected from the Methodology.

Total emission reductions were computed using Equation 3 from the Methodology. All emission sources within the project boundary are properly accounted for in calculations.

### 7.2 Verification Assessment Techniques and Processes Employed

Copies of the charge size data used in the calculations, including manufacturers specifications and contractor installation records, were compared with the data used in the final calculations and tested for transcription or mathematical errors. First Environment sampled all areas identified as being of high risk of inaccuracy, uncertainty, or misstatement and performed other data checks in order to assess whether the project sufficiently mitigated data uncertainty. The assessments performed on this data, as described above, confirmed the reliability of the evidence provided and verified the accuracy of the information flow. Additionally, 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.

The evidence provided was consistent with the requirements of the Methodology and the validated GHG Project Plan and meets generally accepted evidentiary standards for best practices in GHG accounting.

## 8. Audit Results

Therm provided good documentation for its emissions estimates as well as its procedures surrounding the data collection process. To complete the verification process, First Environment issued corrective action and clarification requests. Through communications with the Audit Team, Therm resolved all requests made by First Environment during the verification processes. The findings issued, as well as Therm's responses, are summarized in Appendix A of this report.

## 9. Verification Conclusion

First Environment was retained to provide verification services for the Project's GHG emission reductions assertions based on the following fundamentals:

- *Level of assurance:* Reasonable assurance.
- *Objectives of verification:* To assure project conformance with the verification criteria and that the requirements of the ACR Validation and Verification Standard, Chapter 8.B are met.
- *Verification criteria:* American Carbon Registry Standard, Version 7.0, December 2020; Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, Version 2.1, including Errata and Clarification; approved GHG Project Plan.
- *Definition of materiality:* Misstatements of greater than five percent of the GHG reduction assertion and qualitative non-conformities with verification criteria are considered material.
- *Scope, including:*
  - *Boundaries of the assertion:* Emissions from the operation of the refrigeration equipment, emissions resulting from the recharging and servicing of that equipment, and end-of-life (EOL) / disposal emissions.
  - *The physical infrastructure, facilities, and activities within the assertion:* Large Commercial Refrigeration equipment
  - *GHG sources, sinks, and reservoirs included within the assertion:* Emissions reductions (expressed in units of Carbon Dioxide equivalents) resulting from refrigerant replacement; Project emissions from use of eligible refrigerants.
  - *The time period for the assertion:* January 16, 2020 to October 22, 2020.

Based on the assessments performed and the historical evidence collected, First Environment concludes that the Project's GHG emissions reductions, due to the transitions to a low-GWP refrigerant in Advanced Refrigeration systems installed at Grocery Outlet supermarkets in Canoga Park, California; Dixon, California; and East Sacramento, California and Raley's Supermarket in Sacramento, California for the above-referenced time period, can be considered with a reasonable level of assurance:

- consistent with the GHG Project Plan,
- in conformance with the ACR standard and the Methodology, and
- without material discrepancy.

Verified results show<sup>2</sup>:

January 16, 2020 – October 22, 2020	Total
Baseline Emissions (m.t.CO <sub>2</sub> e)	13,370
Project Emissions (m.t.CO <sub>2</sub> e)	8
Emissions Reductions (m.t.CO <sub>2</sub> e)*	13,360

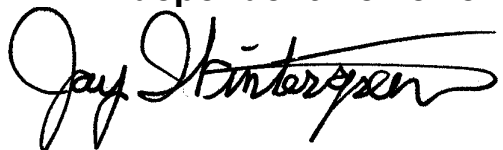
\*As measured and calculated in accordance with the Project Methodology

## 10. Lead Verifier Signature



Michael M. Carim  
Senior Associate

## 11. Independent Reviewer Signature



James Wintergreen  
Senior Associate

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<sup>2</sup> Totals may not sum due to rounding

## APPENDIX A – Verification Findings

ID	Corrective Action Request	Summary of Participant Response	Verification Conclusion
1	The reported cooling capacity for the Raley's store does not appear to include the capacity of low temperature compressors.	Therm provided clarification on the cooling capacity calculation of the Raley's store that confirmed the low-temperature units are properly accounted for in the total system capacity.	Response is acceptable.
2	The CO <sub>2</sub> and ammonia charge sizes applied in calculations for Raley's are inconsistent with verification records provided. Gas purchase records indicate 5,100 lbs of CO <sub>2</sub> and 200 lbs. of ammonia were purchased from Airgas, however only 3,300 lbs. and 150 lbs. of CO <sub>2</sub> and ammonia, respectively, are reported in emission reduction calculations.	The exact charge size of the Raley's system could not be determined from verification evidence provided; therefore, Therm accounted for the total quantity of CO <sub>2</sub> purchased for the ARS system—as documented in purchased invoices—in the calculation of project emissions.	This is conservative.  Response is acceptable.

ID	Clarification Request	Summary of Participant Response	Verification Conclusion
1	Please clarify the source of data for the propane charge sizes assigned to the Dixon and Canoga Park stores.	Therm provided evidence of the system charge sizes from the contractors who charged the ARS systems.	Response is acceptable.