

Validation Report for Therm Solutions, Inc.

American Carbon Registry

September 2022

**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. Validation Scope & Criteria	1
4. Project Description.....	2
5. Overview of the Validation 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 Validation Plan	3
5.5 Site Visit	3
5.6 Data Management Systems Assessment	3
5.7 Corrective Actions and Supplemental Information	4
5.8 Validation Reporting.....	4
6. Validation Results	4
6.1 Project Boundary.....	4
6.2 Baseline Scenario	4
6.3 Emission reduction quantification methodologies and calculations	4
6.4 Data Monitoring and Management System	5
6.5 QA/QC Procedures	5
6.6 Project-specific conformance to ACR eligibility criteria, including additionality ..	6
6.7 Additionality.....	7
6.8 Approved Variance or Deviations.....	8
7. Audit Findings	8
8. Validation Conclusion and Statement.....	8
9. Lead Auditor Signature	9
10. Independent Internal Reviewer Signature	9
APPENDIX A – VALIDATION FINDINGS	10

TABLES

TABLE 1: Monitoring Parameters.....	5
TABLE 2: ACR Eligibility Criteria.....	6
TABLE 3: Methodology Criteria.....	7

1. Introduction

First Environment, Inc. (First Environment) provides this validation report to Therm Solutions, Inc. (Therm) as a deliverable of the American Carbon Registry (ACR) project validation process. It covers the validation 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.

First Environment conducted validation activities from the date of the kickoff meeting through September 14, 2022.

2. Objectives

The purpose of the validation was, through review of appropriate evidence, to establish that:

- the objectives of the ACR Validation and Verification Standard Chapter 1.B are met; and
- the Project conforms to the requirements of the criteria discussed in Section 3 of this report.

Validation activities also include an assessment of the likelihood that implementation of the project will result in the emission reductions as stated by Therm in the GHG Project Plan.

3. Validation Scope & Criteria

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

Geographic Boundaries	Supermarkets located in: <ul style="list-style-type: none"> • East Sacramento, CA • Sacramento, CA • Dixon, CA • Canoga Park, CA
Greenhouse Gases Included	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO ₂ -e) resulting from refrigerant replacement; Project emissions from use of eligible refrigerants R-290 (propane) or R-744 (carbon dioxide) and R-717 (ammonia)
Crediting Period	1/16/2020 – 1/15/2030
Level of Assurance	Reasonable assurance
Definition of Materiality	Non-conformities with the Standards of Validation listed below are considered material

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

Standards of Validation	<ul style="list-style-type: none"> • ACR Standard, Version 7.0, December 2020 (ACR Standard) • Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems,
--------------------------------	--

	Version 2.1, August 2021 (the Methodology), including Errata and Clarification issued August 13, 2021
Validation Process	<ul style="list-style-type: none"> • ACR Validation and Verification Standard, Version 1.1, May 2018 • ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

4. Project Description

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 systems¹ that utilize R-290 (Propane) as the low-GWP refrigerant. All supermarkets are new store locations that opened in 2020. 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 Project is implemented as an Aggregated Project. The four locations identified in the preceding paragraph where ARS are installed comprise the Aggregate.

The GHG Project Plan provides additional details about the Project.

5. Overview of the Validation Process

The following validation process was used:

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

The validation process was utilized to evaluate whether the Project's approach, as outlined in the GHG Project Plan, is consistent with the ACR Standard and the approved ACR methodology.

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

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 this Project. A project-specific conflict of interest form was also filed with the ACR.

5.2 Audit Team

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

Lead Assessor – Michael Carim
Validation Team – Logan Simpson
Internal Reviewer – James Wintergreen

5.3 Audit Kick-off

The audit process was initiated with a kick-off meeting on August 11, 2022 with the primary Therm contacts. The meeting focused on confirming the scope, schedule, and data required for validation activities.

5.4 Development of the Validation Plan

The Audit Team formally documented the validation plan as well as determined the data sampling plan. The validation plan was informed by the kick-off meeting where key elements of the validation 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 validation processes and established project deliverables. Therm was afforded the opportunity to comment on the key elements of the plans for validation. 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:

- John Tinsley
- 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 Data Management Systems Assessment

This assessment used information and insights gained during the previous steps to evaluate the Project's data management systems to assess their adequacy and ability to capture the data necessary to accurately quantify emission reductions.

5.7 Corrective Actions and Supplemental Information

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

5.8 Validation Reporting

Validation reporting, represented by this report, documents the validation process and identifies its findings and results. Validation reporting consists of this report for Therm, along with a validation conclusion. The report is submitted to ACR as part of the validation reporting process.

6. Validation Results

6.1 Project Boundary

The Project boundary is defined as emissions from Equipment Operation (SSR 5), Equipment Service/Recharges (SSR 6), and EOL/Equipment Disposal (SSR 7). Fugitive emissions of refrigerants occur in the baseline and project scenarios during the operation, servicing, and end-of-life of the refrigeration products. Emission reductions occur from the replacement of high-GWP refrigerants with a low-GWP refrigerant, either R-290, R-744, or R-717 in combination with R-744 in cascade systems.

The Audit Team assessed the source, sink, and reservoir (SSR) determination included in the GHG Project Plan and found the justification accurate and in accordance with the Methodology.

Overall, Therm provided an accurate description of the Project boundary and a comprehensive justification for the project SSRs.

6.2 Baseline Scenario

The baseline scenario is defined as the continued use of the baseline refrigerants in Large Commercial Refrigeration systems. Consistent with Table 6 in the Methodology, the baseline refrigerant is assumed to be R-407A.

6.3 Emission reduction quantification methodologies and calculations

Emission reductions are quantified in accordance with the procedures described in the Methodology and the ACR Standard. The equations are correctly identified in the GHG Project Plan and the calculation of GHG emission reductions is presented in a transparent manner, incorporating all relevant GHG sources, sinks, and reservoirs.

Baseline emissions are quantified according to Equation 1 in the Methodology based on the quantity of refrigerant used in the baseline system and the annual amortized emission rate of the baseline refrigerants. The quantity of refrigerant used is based on the cooling capacity and default refrigerant charge size of the equipment type utilized in the project scenario.

Project emissions are quantified according to Equation 2 in the Methodology based on the quantity of alternative refrigerant used in the project system and an annual amortized emission rate set equal to that used in the baseline system. The quantity of alternative refrigerant used is based on the actual charge size of the equipment utilized in the project scenario.

Leakage emissions are not accounted for in the Project boundary and are not quantified under the Methodology.

Total net emission reductions are determined according to Equation 3 in the Methodology by subtracting project emissions from baseline emissions.

After reviewing the quantification procedure and supporting evidence, the Audit team concluded that the methodologies and the applicable tools have been applied correctly to calculate baseline emissions, project emissions, and net GHG emission reductions and removals.

6.4 Data Monitoring and Management System

The monitoring plan described within the GHG Project Plan includes all relevant data and parameters required to obtain a reliable result of generated emission reductions and meets the requirements of the Methodology. The primary variables to be monitored in order to determine and account for emission reductions are presented in Table 1 below.

TABLE 1: Monitoring Parameters

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	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 GHG Project Plan includes a complete description of the frequency, responsibility, and procedures for recording, storing, monitoring, and measuring all project data. All requirements in Sections 5.1 and 5.2.1 of the Methodology are addressed by the monitoring plan contained within the GHG Project Plan.

The adequacy of the data management systems described in the monitoring plan was assessed during the site visit by reviewing installed equipment on-site and during the desktop review through tracing data back to its origin.

6.5 QA/QC Procedures

The GHG Project Plan includes 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.

6.6 Project-specific conformance to ACR eligibility criteria, including additionality

The Project meets the eligibility requirements set forth in the ACR Standard as described in Table 2 below.

TABLE 2: ACR Eligibility Criteria

Eligibility Requirement	Conformance Details	Validation Conclusion
Start Date	The start date for the project is January 16, 2020	Consistent with requirement.
Minimum Project Term	N/A – project type does not contain risk of emission reduction reversal	N/A
Crediting Periods	Ten years – January 16, 2020 – January 15, 2030	Consistent with requirement.
Real	Refrigerant transition is performed in accordance with an approved ACR methodology to produce verifiable evidence of emissions mitigation.	Consistent with requirement.
Emission or Removal Origin	The project proponent reduces non-energy direct emissions through end users' utilization of advanced refrigeration systems.	Consistent with requirement. Therm acquires ownership of emission reductions through agreements with store owners of the locations where the Project occurs.
Offset Title	Therm retains rights to GHG emission reductions associated with the refrigerant transition through terms and conditions with supermarkets.	Consistent with requirement. Therm retains ownership of emission reductions through terms and conditions with customers. Review of terms and conditions of sale from equipment suppliers of stand-alone refrigeration units confirmed that equipment manufacturers do not assert any claim any title to emission reductions.
Additional	Project satisfies additionality test in approved methodology and Regulatory Test in ACR Standard.	Project conforms to ACR additionality criteria. See Section 6.7 below for conformance details.
Permanent	N/A – project type does not contain risk of emission reduction reversal.	N/A
Net of Leakage	N/A – the Methodology does not require leakage accounting.	N/A
Independently Validated and Verified	Therm contracted First Environment, Inc. to provide independent, trustworthy, and	First Environment is an ANAB-accredited and ACR-approved validation/verification body.

Eligibility Requirement	Conformance Details	Validation Conclusion
	objective third-party validation services to the Project.	Audit activities were performed independently and in accordance with all ACR requirements.
Environmental & Community Assessments	No negative community or environmental impacts are identified. Net positive impact due to lower GHG emissions.	Consistent with requirement. Project occurs in refrigeration systems at privately-owned supermarkets. No negative external environmental or community impacts are created from the refrigerant transition.

The Project complies with the applicability requirements of the Methodology. The table below lists the relevant applicability requirements and identifies how the Project meets them.

TABLE 3: Methodology Criteria

Eligibility Requirement	Conformance Details	Validation Conclusion
Location	All supermarkets where project ARS is installed are located in North America	Consistent with requirement.
Refrigerant Sector and Segment	Large Commercial Refrigeration	Consistent with requirement. Project equipment is used to store and display chilled and frozen goods for commercial sale in supermarkets and has a charge size greater than 50 lbs. ACR has approved the classification of ARS systems at supermarkets (Dixon, CA and Canoga Park, CA) utilizing stand-alone systems with charge sizes less than 50lbs. as Large Commercial Refrigeration equipment.
Start Date	See Table 3 above	
Alternative Refrigerant	R-744 (carbon dioxide), R-717 (ammonia) and R-290 (propane)	Consistent with requirement.

The Project does not participate in any other GHG emission trading or compliance programme nor has it been rejected by another GHG programme.

6.7 Additionality

The Project satisfies the requirements for the demonstration of additionality specified by the ACR Standard by passing an approved practice-based performance standard and a regulatory surplus test.

The Project consists of the use of an eligible refrigerant in Large Commercial Refrigeration systems at supermarkets, which is an Eligible Refrigerant Sector and Segment listed in the Methodology; therefore, it satisfies the performance standard specified by the Methodology.

No existing laws mandate the use of a low-GWP refrigerant in refrigeration units. Therm provided a technical memo as well as an attestation confirming that the transition to low-GWP refrigerants at the project locations was voluntary.

6.8 Approved Variance or Deviations

The Project received a deviation approval from ACR to allow for validation activities to be completed by September 16, 2022.

7. Audit Findings

To complete the validation process, First Environment issued corrective action requests. Through communications with the Audit Team, Therm resolved all requests made by First Environment during the validation processes. The findings issued, as well as Therm's responses, are summarized in Appendix A of this report.

8. Validation Conclusion and Statement

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

- *Level of assurance:* Reasonable assurance.
- *Objectives of validation:* To assure project conformance with the validation criteria and that the requirements of the ACR Validation and Verification Standard, Chapters 1.B. Validation objectives also include an assessment of the likelihood that implementation of the Project will result in the emission reductions stated in the GHG Project Plan.
- *Validation 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.
- *Definition of materiality:* Non-conformities with validation 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.
 - *Project Credit Period:* January 16, 2020 to January 15, 2030.

Regarding the validation process, the review of the GHG Project Plan and the resolution of all corrective action requests have provided First Environment with sufficient evidence to determine the fulfillment of stated criteria to a reasonable level of assurance.

The total emission reductions in metric tonnes of CO₂e from the Project are projected as follows over the selected crediting periods:

Project Name	ACR Project ID	Emission Reductions
ARS2020002	ACR791	13,365 MT CO ₂ e

The emission reduction forecasts have been checked, and it is deemed likely that the stated amount will be realized given that the underlying assumptions do not change.

In summary, it is First Environment's opinion that the ARS2020002 project, as described in the GHG Project Plan, meets all relevant ACR requirements and correctly apply the Methodology.

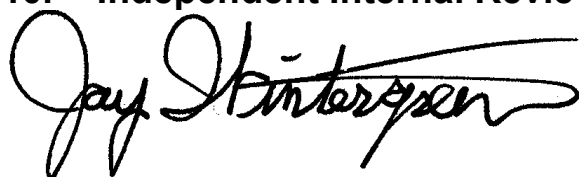
The validation of the Project is based on the information made available to us and the engagement conditions detailed in this report. First Environment cannot guarantee the accuracy or correctness of this information. Hence, First Environment cannot be held liable by any party for decisions made or not made based on this report or opinion.

9. Lead Auditor Signature



Michael M. Carim
Senior Associate

10. Independent Internal Reviewer Signature



James Wintergreen
Senior Associate

APPENDIX A – VALIDATION FINDINGS

ID	Corrective Action Request	Summary of Participant Response	VVB Conclusion
1	Please provide justification for the reported store opening date for the Grocery Outlet Windsor, CA location of December 15, 2020. The Grocery Outlet corporate website identifies a store opening date of February 4, 2021.	The Grocery Outlet Windsor, CA location was removed from the Aggregate to resolve the issue.	Response is acceptable.
2	The monitoring box for the parameter $GWP_{REF,j}$ in Section D1 of the Project Plan and Section V, 2 of the Monitoring Report incorrectly references the project system in the Description row.	The Project Plan and Monitoring Report were revised to resolve the issue in the parameter box for $GWP_{REF,j}$.	Response is acceptable.

ID	Clarification Request	Summary of Participant Response	VVB Conclusion
<i>No requests for clarification were issued during the validation/verification process.</i>			