ACR815
PROJECT PLAN

Revision 6

February 2023

ADVANCED REFRIGERATION PROJECTS FOR USE OF NEW ULTRA LOW-GWP LARGE REFRIGERATION RACKS IN UNITED STATES

ACR Project ID	Vintage	Location	Project Name
815	2022	US(NC)	Advanced Refrigeration - ARS2022001

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A. PROJECT OVERVIEW

A1. PROJECT TITLE - Overview

This filing is for (1) project seeking to validate and verify ERTs pursuant to the Advanced Refrigeration Systems 2.1 Methodology.

Table 1 – Project Vintages and Locations

ACR Project ID	Vintage	Location	Project Name
815	2022	US(NC)	Advanced Refrigeration - ARS2022001

A2. PROJECT TYPE

Industrial Process Emissions

A3. PROOF OF PROJECT ELIGIBILITY

Project is eligible under the “Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, Version 2.1. Certain project eligibility requirements are specified within the Methodology and others are specified within the ACR Standard, Version 7.0.

Table 2 – Project Eligibility Criteria

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Geographic location	The project must be in North America	The large commerical refrigeration units include refrigeration systems and are installed in NC in the US.
Eligible Sectors	The project must be in a sector and segment which has a low adoption rate for the relevant project activity ("Eligible Project Activity" & "Eligible Refrigerator Sector/Segment") as defined in Table 1 of the Methodology. If the project activity involves replacement of CFC, HCFC or HFC based equipment with an advanced refrigeration system where he original equipment is decommissioned, any CFC or HFC in the original equipment must be recovered and destroyed in accordance with ACR or the California Air Resource Board ODS Destruction Methodology and any HFCs must be managed in accordance with EPA regulations (40CFR Part 82, Subpart F) under Section 608 of the Clean Air Act; Any refrigerant used in the advanced refrigeration system must be an acceptable substitute according to United States EPA Significant New Alternatives Policy (SNAP) program for use in commercial refrigeration end-uses in accordance with SNAP use conditions.	The project's system includes refrigeration system(s) which falls within the Large Commercial Refrigeration sector and uses low-GWP refrigerants. The system(s) all exceed the lower-end initial charge requirement of 50 lbs or more of refrigerant, as defined by the Advanced Refrigeration Methodology. The project refrigerant(s) are an acceptable substitute under SNAP.
Start Date	Date for all projects other than AFOLU as the date on which the project began to reduce GHG emissions against its baseline. Non-AFOLU Projects must be validated within 2 years of the project Start Date. One exception applies to these timeframes: - Projects using a newly approved methodology or a newly approved modification that expands the eligibility of a previously published methodology may submit it for listing with ACR within 10 years of the project Start Date. - However, the date of listing submittal must be within 6 months of the methodology publication date, and the project must then be validated within 2 years of the listing. - The Start Date and the start of the Minimum Project Term shall be the same. - The Start Date and the start of the first Crediting Period are generally the same, unless otherwise allowable in the relevant methodology.	The project start date is 08/27/2022 determined by the earliest date of store initation.

Minimum Project Term	The Minimum Project Term for specific project types is specified in the relevant ACR sector standard and/or methodology. Project types with no risk of reversal subsequent to crediting have no required Minimum Project Term.	There is no risk of reversal for this project type and, therefore, there is no required minimum project term
Crediting Period	The Crediting Period for non-AFOLU projects shall be ten (10) years.	This is a non-AFOLU project, therefore the Crediting Period is 10 years for each project
Real	GHG reductions and removals shall exist prior to ERT issuance. ACR will not forward issue nor forward register a projected stream of future offsets.	GHG reductions occur from the replacement of baseline refrigerants in the operations of large refrigeration systems over 10 years from the project start date. ACR issues the full 10 years of emission reductions upon final Project Verfication.
Emission or Removal Origin	Project Proponent shall own, have control, or document effective control over the GHG sources/sinks from which the emissions reductions or removals originate. If the Project Proponent does not own or control the GHG sources or sinks, the Proponent shall document that effective control exists over the GHG sources and/or sinks from which the reductions/removals originate.	The Project Proponent is Therm Solutions, Inc. The Manufacturer and end use customer(s) Performance Food Group have maintained control over the GHG sources/sinks from which the emission reductions orginate. Documentation showing effective control of GHG sources from which the reductions originate is maintained for this project. The manufacturer(s) maintained control over the equipment during the manufacturing and installation process. Once installed control and title moved to the end customer(s), Performance Food Group
Offset Title	Project Proponent shall provide documentation and attestation of undisputed title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past. Title to offsets shall be clear, unique, and uncontested.	Documentation will be provided showing that title to the offset is clear, unique and uncontested and that the offsets have not been previously sold

Additional	The Methodology requires projects to pass the Regulatory Surplus Test and meet the ACR Practice-Based Performance Standard. Practice-Based Performance Standard: The Methodology has already completed a market adoption analysis. Therefore, project proponents must only show that their project falls into one of the Eligible Sectors found in Table 1 of the Methodology to pass the Practice-Based Performance Standard. Regulatory Surplus Test: The project proponent must demonstrate that Project maintains compliance with all laws, regulations, and other legally binding mandates directly related to project activities. To meet this requirement, project proponents will submit a written and signed attestation to the verifier acknowledging the compliance status of the project during each verification interval.	This project passes the ACR-approved Practice-Based Performance Standard and the Regulatory Surplus Test. Practice-Based Performance Standard: The project meets the criteria for Large Commercial Refrigeration, as defined in Table 1 of the methodology, which means it has a low adoption rate. Regulatory Surplus Test: The project passes the Regulatory Surplus Test as there are no federal, state, or facility specific regulations requiring the emission reductions associated with the project's transition from the baseline/default refrigerant to the project refrigerant.
Regulatory Compliance	Projects must maintain material regulatory compliance. In order to maintain material regulatory compliance, a project must complete all regulatory requirements at required intervals. Project Proponents are required to provide a regulatory compliance attestation to a verification body at each verification. This attestation must disclose all violations or other instances of noncompliance with laws, regulations, or other legally binding mandates directly related to project activities.	This project maintains material regulatory compliance for the entire reporting period.
Permanent	For projects with a risk of reversal of GHG removal enhancements, Project Proponents shall assess risk using an ACR-approved risk assessment tool.	There is no risk of reversal of GHG removal enhancements for this project type.
Net of Leakage	The Methodology has determined there is no market-shifting leakage and, hence is to be disregarded. Activity shifting leakage - If the Project Activity results in the equipment used in the baseline being transferred to another location or activity in which a refrigerant with a GWP greater than 15 is used, leakage effects are to be considered. If the baseline equipment is also used in the project or is decommissioned, then leakage is to be disregarded.	Leakage is not considered for this project, as detailed in section E3.

Independently Validated and Verified	ACR requires third-party validation and verification, by an ACR-approved Validation/Verification Body (VVB), at specified intervals in order to issue ERTs. Governing documents for validation and verification are the ACR Standard, relevant sector standard, relevant methodology, and the ACR Validation and Verification Guideline.	According to ACR rules, the project benefits will be validated and verified by an independent auditor.
Community & Environmental Impacts	ACR requires community and environmental impacts to be net positive overall. Project Proponents shall document in the GHG Project Plan a mitigation plan for any foreseen negative community or environmental impacts and shall disclose in their Annual Attestations any negative environmental or community impacts or claims of negative environmental and community impacts.	The project has only positive effects on the environment. The use of low GWP Refrigerant avoids the loss of high-gwp refrigerants during the operation of the large refrigeration systems. Potential negative impacts were considered for this project and there were not found to be any. The projects also address aspects of the UN's Sustainable Development Goals. Additional detail can be found regarding this topic in section F.

A4. LOCATION

Table 3 – Installation Locations

Location	GPS Coordinates
543 12th St Dr NW, Hickory, NC 28601, USA	35.73902332538567, -81.36357708652467

Table 4 – Project Location

ACR Project Numbers	Locations
815	US(NC)

A5. BRIEF SUMMARY OF PROJECT

Description of Project Activity

The Project Activity is the installation of new low-GWP refrigerant in large commercial refrigeration system(s) installed at the location(s) indicated in Table 3.

The system(s) are all newly manufactured and installed at facilities that previously would have used high-GWP refrigerants. Refrigerant is injected into the systems during system startup process and then sealed within the system. Since the end use customers have the option to purchase systems with high-GWP refrigerants at any given time, only low-GWP systems provide incentives.

Background Information

Refrigerants are a necessary ingredient in the production of large commercial systems for retail food refrigeration. These refrigerants contain chemicals that release GHGs during manufacture, operation, and end-of-life (destruction). The Montreal Protocol has taken action to limit the use of high-GWP refrigerants and over the years the US EPA implemented the Significant New Alternatives Program (SNAP) to work with and guide industry in these transitions. The AIM Act (Dec. 2020) has also published a drawdown schedule, which ends in 2036 with a phased down rate 15% of 2021 baseline production. As a result, the majority of refrigerants currently in the market today are HFCs, however, a significant amount of HCFC's are still in use due to a ruling from the EPA in 2014 that gave allowances for the production and consumption of certain HCFC refrigerants for specific end case uses that include refrigeration and air-conditioning applications.

An opportunity to reduce emissions beyond regulatory compliance is by replacing HFC and HCFC refrigerants with low-GWP refrigerants.

Project Purpose(s) and Objective(s)

The purpose of these projects is to avoid the GHG emissions that would have been produced by manufacturing, installation, and operation of high-GWP baseline refrigerants, by installing low-GWP refrigerants.

A6. PROJECT ACTION

Description of prior physical conditions

The owners of this project have been using refrigeration equipment for the commercial and retail food market for many years and have historically used CFCs, HCFCs, and HFCs as refrigerants. Prior to the transition to new low-GWP refrigerant, owners were using refrigerants as outlined in Table 6. While the owners still use high-GWP refrigerants in many of their location(s), the location(s) included in this project were built with new low-GWP refrigeration systems. They chose to go above and beyond regulatory requirements through this installation.

Description of how the Projects will achieve GHG reductions and/or removal enhancements

The owners chose to install low-GWP refrigerants and refrigeration systems for the locations included in these projects. The voluntary transition to a low-GWP refrigerant results in a reduced amount of GHG in the operation of the systems installed. The project measures the amount of SNAP-approved, low-GWP refrigerant used by the system owners against the amount of baseline refrigerant, as listed in Table 6. Baseline refrigerant quantities and leakage rates are established as specified by the methodology for large commercial refrigeration systems. Specific methods and quantities are outlined in Table 9.

Description of projects technologies, products, services and expected level of activity

The technologies, product, and services included in this project are cooling, in the form of advanced commercial refrigeration. The quantity of cooling and associated emissions reductions for the new systems installed during this project are as follows:

Table 5 - Level of Activity

Property	New System Capacity (kbtu/hr)	$AR_{k,i}$ (kgs)	New System Charge (lb)	Total Reduced Emissions (CO_2e)
Performance Food Group Hickory, NCR-22 (HCFC-22)	NA	1000.2	2205.0	19,002.5
TOTAL	-	1000	2205	19002

A7. EX ANTE OFFSET PROJECTION

Table 6 – Ex-Ante ERT Projection

Vintage	ACR Project Number and Location	Baseline Refrigerant[1]	Project Refrigerant [1]	Baseline Refrigerant GWP[2]	Project Refrigerant GWP[2]	Total ERTs (tonnes $CO2_e$)[3]
2022	815 US(NC)	R-22 (HCFC-22)	R-717 (ammonia)	1,764	0	19,002.5

1 Baseline refrigerant and GWP is from Table 6 (Baseline Refrigerant (GWP for Large Commercial Refrigeration and Remote Condensing Units) in the methodology

2 GWP as published by GWPs listed are ARC standard 7.0, 100-year GWPs.

3 Total offsets created reflects the Methodology calculation that allows for all 10 years of reductions to be issued as ERTs upon Verification.

As these are retrofit projects, baseline emissions are calculated using the baseline system characteristics and refrigerant GWP(s). Calculations are conducted using Equation 1, with parameters as specified in Section E1 of this document.

ACR has granted a "Forward Crediting Policy Revision" in relation to the Methodology. The revision states the following: "An advanced refrigeration transition project must result from an action that has already occurred (the transition to a low-GWP refrigerant) and that action must be verifiable. To quantify avoided emissions associated with the transition to a low-gwp refrigerant, it is necessary to utilize modeled emission rates over a 10-year crediting period. These avoided emissions are quantified during the project's reporting period and, pending a successful verification, Emission Reduction Tonnes (ERTs) are granted for the full 10 years of avoided emissions." The emission rates found in the Methodology are derived from EPA sources and were accepted for use in the ACR methodology development process.

ACR's forward crediting prohibition shall not apply to refrigerant transition projects utilizing ACR's "Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, Version 2.1."

A8. PARTIES

The project is not in any GHG program under any governmental regulatory process. Therm is the developer of the offsets. Land title is not relevant to this project type.

Therm- Project Proponent

Therm is a registered Project Proponent with the ACR. Therm focuses on refrigeration and related projects.

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Performance Food Group -End Use Customer

Performance Food Group delivers more than 300,000 food and related products to customers across the United States and Canada

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B. METHODOLOGY

B1. APPROVED METHODOLOGY

These projects are submitted under the approved methodology entitled “Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from Advanced Refrigeration Systems, Version 2.1”, issued in August 2021.

B2. METHODOLOGY JUSTIFICATION

The projects involve the transition of large commercial refrigeration systems from high-GWP refrigerants to low-GWP refrigerants. The chosen methodology provides the quantification framework for the creation of carbon credits (ERTs) from the GHG reductions resulting from these activities.

B3. PROJECT BOUNDARIES

The physical boundary for the projects makes up the complete aggregated physical boundary of the projects. The physical boundary for the project includes the locations within North America where the systems are operated. The temporal boundaries for the projects fall between as outlined in Table 7 below.

Table 7 – Project Boundaries

ACR Project #	Physical Boundary	Temporal Boundary
815	US(NC)	08/27/2022 - 08/26/2032

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

Table 8 - GHG Sources and Sinks

SSR	Source Description	Gas	Included (I) or Excluded (E)	Quantification Method
1 Refrigerant Production	Fossil fuel emissions from the production of refrigerants	CO2	E	N/A
		CH4	E	N/A
		N2O	E	N/A
	Refrigerant leaks during production	HFC	E	N/A
		Low-gwp Refrigerant	E	N/A
2 Refrigerant Transport	Fossil fuel emissions from transport of refrigerants	CO2	E	N/A
		CH4	E	N/A
		N2O	E	N/A
	Refrigerant leaks during transport	HFC	E	N/A
		Low-gwp Refrigerant	E	N/A
3 Equipment Manufacture	Fossil fuel emissions from the operation of the refrigeration system in the baseline and the project.	CO2	E	N/A
		CH4	E	N/A
		N2O	E	N/A
4 Equipment Delivery and	Fossil fuel emissions from the delivery and installation of the	CO2	E	N/A
		CH4	E	N/A

Installation	advanced refrigeration system.	N2O	E	N/A
5 Equipment Operation	Fossil fuel emissions from the operation of the refrigeration system in the baseline and the project.	CO2	E	N/A
		CH4	E	N/A
		N2O	E	N/A
	Refrigerant leaks from the operation of the refrigeration system in the baseline and the project.	CFC	I	See Methodology Table 4
		HCFC	I	See Methodology Table 4
		HFC	I	See Methodology Table 4
		Low GWP refrigerant	I	See Methodology Table 4
6 Equipment Service/Recharge	Fossil fuel emissions from servicing refrigeration or A/C equipment or system to replace leaked refrigerant	CO2	E	N/A
		CH4	E	N/A
		N2O	E	N/A
	Refrigerant emissions occurring from servicing refrigeration or A/C equipment or system to replace leaked refrigerant	HFC	I	See Methodology Table 4
		Low GWP Refrigerant	I	See Methodology Table 4
7 Equipment Disposal	Emissions from the disposal of the equipment at end-of-life, including destruction of refrigerant.	CO2	E	N/A
		CH4	E	N/A
		CFCs	I	See Methodology Table 4
		HCFC	I	See Methodology Table 4
		HFCs	i	See Methodology Table 4

B5. BASELINE

The baseline scenario is the use of high-gwp refrigerant in the operation of large commercial refrigeration systems. Baseline quantities are calculated as shown in the table below.

Table 9 – Baseline Scenario

Property	Type of System	$ERA_{REF,j}$ (%)[1]	Baseline Refrigerant[2]	$GWP_{REF,j}$ (GWP)[3]	$QBR_{j,I}$ (kg)[4]
Performance Food Group Hickory, NCR-22 (HCFC-22)	Rack	40.82%	R-22 (HCFC-22)	1,764	2639

1. For New Construction -Per methodology Table 4; for transition projects, actuals

2. For new construction -Per methodology Table 6 assessed by property state; for transition projects, actuals

3. For new construction- Per methodology Table 6 assessed by property state; for transition projects, actuals

4. For new construction-Calculated using Table 4 “Charge Size” categorization and cooling capacity of the new system; for transition projects, actuals

B6. PROJECT SCENARIO

The project scenario is the use of low-GWP project refrigerant in the operation of large commercial refrigeration systems.

B7. REDUCTIONS AND ENHANCED REMOVALS

The projects are based on a simple premise of product replacement and mass-balance. The baseline/default refrigerant has a high-GWP that produces a significant amount of GHG during the manufacturing, operation, and end-of-life of refrigeration systems. The project refrigerant has a low-GWP and emits virtually no GHG during the lifetime of the systems. Baseline/default refrigerant GHG emissions minus project refrigerant GHG emissions equals the project emission reductions and enhanced removals.

B8. PERMANENCE

There is no risk of reversal. Once the refrigeration system is installed with the low-GWP refrigerant the associated GHG reductions are fixed. This applies to all aggregated sites in this project plan.

C. ADDITIONALITY

Assessment of the Additionality of a project under this Methodology is defined in the Methodology itself. It is made based on passing the following two tests:

1. Regulatory Surplus Test, and

2. Practice-Based Performance Standard

C1. REGULATORY SURPLUS TEST

To pass the regulatory surplus test a project must not be mandated by existing laws, regulations, statutes, legal rulings, or other regulatory frameworks in effect as of the start date that directly or indirectly affect the credited offsets.

The Project is not mandated by existing laws, regulations, statutes, legal rulings, or other regulatory frameworks in effect as of the start date that directly or indirectly affect the credited offsets.
In the United States, requirements with respect to the GHG potency first arose from implementation of the Montreal Protocol and more recently by its Kigali Amendments. The former targeted Ozone Depleting Substances (ODS) and the latter is directed at high GWP HFC's. Title VI of the 1990 Clean Air Amendments addresses Stratospheric Ozone Protection and includes authority for EPA to regulate ODS's. That led EPA to adopt rules to disallow use of ODS through a progression of rulemaking actions, which includes what are colloquially referred to as Significant Use Alternative Policy or SNAP.

Today, there is still a predominately used ODS containing refrigerant in use due to its large portion of the market share throughout the last few decades. This refrigerant is HCFC-22, more commonly known as Freon. The 2014 ruling from the EPA gave allowances to HCFC-22 phase down through 2019 that resulted in a slower phase down of production and import of HCFC-22 for an end use within the air-conditioning and commercial refrigeration markets. As of 2020, HCFC-22 can no longer be produced or imported in the United States, however, all legacy equipment using this refrigerant can continue to be used for as long as needed by using reclaimed or stockpiled HCFC-22. Additionally, there is no ruling from the EPA to force premature retirement of equipment containing this HCFC. As such, retrofit projects that utilize HCFC-22 as the baseline refrigerant pass the regulatory surplus test.

In 2015 and 2016, the EPA adopted an extensive set of amendments to its SNAP rules of which rules 20 and 21 are particularly relevant. The SNAP 20 regulations were invalidated by the Circuit Court of Appeals for the District of Columbia, to the extent they replaced allowable HFCs with lower GWP HFCs, as exceeding EPA's statutory authority. That decision then led to the Court also invalidating SNAP 21 in 2019. By then, the then-new administration had declared it would not enforce the SNAP 20 and 21 rules unless and until it underwent a new rulemaking action to address the court's decision and rationale and in 2018 EPA stated it will not enforce those rules until further rulemaking is completed. 83 Fed. Reg. 18431 (April 27, 2018). No further action has been taken by EPA to re-adopt these SNAP rules.

State-specific laws in the applicable states for this project US(NC) did not prohibit HFC production and commercial use at time of project. The GWP baselines for this project reflect the status of all laws passed at time of project.

North Carolina is a member of the US Climate Alliance but has not committed to regulating high-gwp refrigerants.

HCFC commercial use along with HFC production and commercial use is not prohibited or mandated at the time of the project.

C2. COMMON PRACTICE TEST

Not applicable.

C3. IMPLEMENTATION BARRIERS TEST

Not applicable.

C4. PERFORMANCE STANDARD TEST

The Methodology has already completed a market adoption analysis. Therefore, project proponents must only show that their project falls into one of the eligible segments found in Table 1 of the Methodology to pass the Practice-Based Performance Standard.

The Project falls into the Large Commercial Refrigeration segment listed in Table 1 of the Methodology.

D. MONITORING PLAN

D1. PARAMETERS MONITORED

Parameter	$QBR_{j,i}$
Units	kg
Description	Quantity of refrigerant j in equipment i used in baseline system (charge size of equipment in kgs). Other than for Large Commercial Refrigeration projects where an existing system is being replaced, use the Refrigerant Charge size default values in Table 4. For Large Commercial Refrigeration projects where existing equipment is being replaced, use regulatory compliance reporting or verifiable historical operating records to establish the charge size of the replaced baseline systems.
Data Source	Calculated from new system design cooling capacity (system specifications) and charge size assumption (specified in Table 4)
Measurement Methodology	For each location new system design cooling capacity (system specifications) and charge size assumption is assigned as specified in Table 4 of the Methodology
Equation #(s)	Equation 1
Data Uncertainty	Methodology sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Manufacturer Records
QA/QC Procedure	Verified that the system indicated on specification matched with the Bill of Lading for each location

Parameter	$AR_{k,i}$
Units	kg
Description	Quantity of alternative refrigerant k used in project system i.
Data Source	Certified charge size documentation from refrigeration contractor
Measurement Methodology	Charge size x # of units
Equation #(s)	Equation 2
Data Uncertainty	Methodology sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Electronically
QA/QC Procedure	Verification of invoices

Parameter	$ERA_{REF,j}$
Units	% per year
Description	Annual amortized emission rate of refrigerant j in baseline system (%).
Data Source	Table 4 - Annual Amortized Emission Rate

Measurement Methodology	Table 4 of Methodology
Equation #(s)	Equation 1
Data Uncertainty	Methodology sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Table 4 - Annual Amortized Emission Rate
QA/QC Procedure	Refer to Table 4 of ARS Methodology - Annual Amortized Emission Rate

Parameter	$GWP_{REF,j}$
Units	Global Warming Potential (GWP)
Description	GWP of refrigerant j used in baseline system.
Data Source	GWP default values in Table 6
Measurement Methodology	Table 6 of Methodology
Equation #(s)	1
Data Uncertainty	Methodology sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Refer to Table 6
QA/QC Procedure	Refer to Table 6

Parameter	$ERA_{REF,k}$
Units	% per year
Description	Annual emission rate of alternative refrigerant k used in project system
Data Source	Set equal to the emission rate of the baseline system.
Measurement Methodology	Table 4 of methodology
Equation #(s)	2
Data Uncertainty	Methodology sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Determined once
QA/QC Procedure	Refer to Table 4 of ARS Methodology

Parameter	$GWP_{REF,k}$
Units	Global Warming Potential (GWP)
Description	GWP of alternative refrigerant k used in project system.
Data Source	IPCC, published governmental reference (e.g., EPA SNAP) or scientific, peer reviewed publication
Measurement Methodology	Table 4 of Methodology
Equation #(s)	2
Data Uncertainty	IPCC, published governmental reference (e.g., EPA SNAP) or scientific, peer reviewed publication sets parameters
Monitoring Frequency	Determined once
Reporting Procedure	Determined once
QA/QC Procedure	Refer to Table 4 of ARS Methodology

D2. MONITORING PLAN

a) Project Implementation

The manufacturer design systems and ship materials to installation locations. Contracted refrigeration contractors then install the specified systems at the facility and fill the system with the new low-GWP Refrigerant, conduct start up and system commissioning.

b) Technical Description of Monitoring Task

Monitoring is conducted exclusively through review of official documents identifying data outlined in Section C, as well as photos confirming systems were installed where specified. Due to the complex and dispersed nature of these systems, documentation provides the most reliable form of monitoring.

c) Data to be Monitored and Collected

The data collection required is as outlined in Section 5.2 of ARS Methodology. Once obtained, this information provides the required metrics to calculate Baseline Emissions (Equation 1), Project Emissions (Equation 2), and Project Emissions Reductions (Equation 3). The parameters to be monitored are determined as outlined in Section D1.

d) Overview of data collection procedures

Records showing the systems were filled with the refrigerant are maintained on file by Performance Food Group, as required by the EPA. All owners use digital recordkeeping systems for data storage. Emission reductions will be achieved at time of construction, and cannot be reversed, however all owners use digital recordkeeping systems for data storage and Therm keeps a digital copy of these records indefinitely.

e) Frequency of the Monitoring

Monitoring will be conducted once at a date after the opening date for the final supermarket included in this project plan.

f) Quality Control and Quality Assurance Procedures

Quality control and quality assurance are conducted by cross-referencing multiple forms of documentation with confirming information and further by photographs of installed equipment.

g) Data Archiving

Records showing the systems were filled with R-717 (ammonia) are maintained on file by Performance Food Group, as required by the EPA. All owners use digital recordkeeping systems for data storage. Emission reductions will be achieved at time of construction, and cannot be reversed, however all owners use digital recordkeeping systems for data storage.

h) Organization and Responsibilities of the Parties Involved in the Above

Therm Solutions – Project Proponent and Developer. Therm works with customers to successfully manage the refrigerant transition process. Olivia Bonnes, Director of Operations, leads the project.
The Manufacturer provides all specifications and data as required by the monitoring plan.

i) Calibration Procedures

Calibration is not applicable for this project type. While routine maintenance is performed on the new systems and refrigerant leakage is monitored, that data is irrelevant to the calculations associated with the project.

j) Sampling Methods

Not required for this project

E. QUANTIFICATION

E1. BASELINE EMISSIONS

Baseline emissions will be calculated according to the following formula:

Equation 1

$$BE_y = \sum_i [(Q_{BR,j,i} \div 1000) \times ERA_{REF,j} \times GWP_{REF,j}] \times 10$$

WHERE

BE_y	Baseline emissions in year y (MT CO_2e)
$Q_{BR,j,i}$	Quantity of refrigerant j in equipment i used in baseline system (Charge Size of equipment in kgs). Other than for Large Commercial Refrigeration projects where an existing system is being replaced, use the Refrigerant Charge Size default values in Table 4. For Large Commercial Refrigeration projects where, existing equipment is being replaced, use regulatory compliance reporting or verifiable historical operating records to establish the charge size of the replaced baseline system.
$ERA_{REF,j}$	Annual amortized emission rate of refrigerant j in baseline system (%). Other than for Large Commercial Refrigeration projects where an existing system is being replaced, use the Annual Emission Rate default values in Table 4. For Large Commercial refrigeration projects where, existing equipment is being replaced, use regulatory compliance reporting or verifiable historical operating records to establish the annual leak rate of the replaced baseline system which shall be based on the average of the previous two years of baseline system operation prior to installation of advanced refrigeration system.
10	Number of years in the crediting period[17]
$GWP_{REF,j}$	Global warming potential of baseline refrigerant j. Other than for Large Commercial Refrigeration projects where an existing system is being replaced, use the GWP default values in Tables 5 and 6. For Large Commercial refrigeration projects where existing equipment is being replaced, use regulatory compliance reporting or verifiable historical operating records to establish the type of refrigerant historically used.[18]

E2. PROJECT EMISSIONS

Project emissions will be calculated according to the following formula:

Equation 2

$$PE_y = \sum_i [(AR_{k,i} \div 1000) \times ERA_{REF,k} \times GWP_{REF,k}] \times 10$$

WHERE

PE_y	Project emissions in year y (MT CO_2e)
$AR_{k,i}$	Charge size of alternative refrigerant k used in project system from manufacturer specifications i (kgs) [19]
$ERA_{REF,k}$	Annual emission rate of alternative refrigerant k set equal to emission rate for baseline system (% per year).
10	Number of years in the crediting period

$GWP_{REF,k}$	Global warming potential of alternative refrigerant k used in the project.

E3. LEAKAGE

By installing an advanced refrigeration system, the project is not increasing overall market demand for refrigeration systems. Thus, there would be no “market-shifting” associated with this project type. Regarding “activity-shifting” leakage, the refrigerant from the existing system, which was replaced by a low-GWP refrigerant, should not be considered as leakage. This is due to the quantification of emission reductions in the methodology does not take into account the emissions occurring from the refrigerant recovered when that system is replaced. For example if X lb's of baseline refrigerant is recovered when the system is replaced with the low-GWP system today, the same amount of baseline refrigerant can also be assumed to be recovered if the system is replaced after ten years. The quantifications of emission reductions does not take into account the emissions from the baseline refrigerant recovered after ten years (if that existing system would have continued to be used for the next ten years). The emissions from the baseline refrigerant recovered today also does not have to be accounted for (or considered leakage). Even if they both were accounted for, they would cancel each other out. Thus, leakage is not considered for this project.

E4. UNCERTAINTY

There is no uncertainty with respect to the projected emission reductions. All calculations are based on baseline and project conditions, which cannot change.

E5. PROJECT EMISSION REDUCTIONS

Equation 3

$$ER_y = [BE_y - PE_y]$$

WHERE

ER_y	Emission reductions in year y (MT CO_2e)
BE_y	Baseline emissions in year y (MT CO_2e)
PE_y	Project emissions in year y (MT CO_2e)

E6. EX-ANTE ESTIMATION METHODS

Emission reductions created from this project are calculated using the baseline refrigerants specified in Table 9, as set by the Methodology, and the project refrigerant GWP values and the cooling capacity and charge sizes of systems put into service in the Reporting Period (Specified in Table 11). The equations in the Methodology calculate the GHG reductions over the first 10 years. There is only one reporting period for each project that will issue all 10 years of ERTs upon final Verification.

F. COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

The potential impacts on the local community and the environment were considered. Positive community impacts from the project include the reduction of GHG emissions from refrigeration equipment manufacturing and operation, both at the local level (near the installed equipment locations) and globally. There were no foreseeable negative impacts to the community or the environment that result from this project.

The project meets and fulfills the applicable UN Sustainability Goals as articulated by the UN Department of Economic and Social Affairs, in #Envision2030:

Goal #9 - Industry, Innovation, and Infrastructure: This project fulfills this goal, specifically subsection 9.4, in that the adoption of low-GWP refrigeration systems is a sustainable upgrade with substantially reduced CO2 emissions per unit of value (in this case food distribution and sale) added. Low-GWP refrigerationsystems both reduce emissions from refrigerant leakage (addressed in this project) and reduce emissions from typically lower energy consumption than comparable HFC or HFC/HFO systems.

Goal #11 – Sustainable Cities and Communities: This project fulfills Goal #11 by reducing climate-damaging emissions which cause natural disasters. Successfully reducing this emissions at scale, for example through use of low-GWP refrigerants, will help prevent the human and economic losses associated natural disasters.

Goal #12 - Responsible Consumption and Production: This project fulfills Goal #12 in several ways related to food production. It reduces the material footprint per capita for supermarkets (12.2) by using lower footprint low-GWP refrigerants. It achieves environmentally sound management of chemicals throughout their life cycle (12.4) by using chemicals that are minimally damaging to the climate and local communities when leaked during use and at time of decommissioning. Finally, it fulfills the goal for companies to adopt sustainable practices (12.6).

Goal #13 – Climate Action: This project fulfills Goal #13 by taking direct climate action through the choice to use a low-GWP refrigerant. Paul Hawken's Drawdown ranks refrigeration as the #1 global drawdown opportunity, based on the total amount of greenhouse gases it can potentially avoid or remove from the atmosphere. Bill Gates' How to Avoid a Climate Disaster calls F-Gases used in traditional AC and refrigeration "extremely powerful contributors to climate change". This project directly addresses one of our world’s most meaningful solutions for climate change.

F2. STAKEHOLDER COMMENTS

Not applicable for this project type.

G. OWNERSHIP AND TITLE

G1. PROOF OF TITLE

Therm owns the title and rights to the carbon offset credits involved in this project. Therm & Performance Food Group have a signed Refrigeration Carbon Development Agreement in place which confirms the transfer of title to Therm.

G2. CHAIN OF CUSTODY

The projects have not produced any offsets to date and, therefore, no offsets have been bought or sold previously. Nor do the projects have a forward option contract in place.

G3. PRIOR APPLICATION

These activities have not previously been the subject of an offset project.

H. PROJECT TIMELINE

H1. START DATE

The start dates for this project and how it was determined are as follows:

Table 10 – Project Start Dates

ACR Project Numbers	Project Start Date	How Determined
815	August 27, 2022	Earliest project start date for aggregated projects: PFG Hickory, NC- 08/27/2022

H2. PROJECT TIMELINE

Table 11 – Project Timelines

ACR Project Numbers	815
Initiation of Project Activities	August 27, 2022
Project Term	N/A
Relevant Project Activities in GHG Project Cycle	The collection of location specific refrigeration data cross referencing monitoring and verification validation.
Crediting Period	8/27/2022-8/26/2032
Reporting Period	8/27/2022-8/27/2022
Frequency of Reporting	Once
Monitoring Period	8/27/2022-8/27/2022
Frequency of Monitoring	Determined once
Frequency of Validation	Once in 2023
Frequency of Verification	Once in 2023