

Hudson Technologies HFC Reclamation Project Georgia 2021

March 13, 2023

Hudson Technologies Company



TABLE OF CONTENTS

Table of Contents.....	2
A. PROJECT OVERVIEW.....	1
A1. PROJECT TITLE.....	1
A2. PROJECT TYPE	1
A3. PROOF OF PROJECT ELIGIBILITY.....	1
A4. LOCATION	5
A5. BRIEF SUMMARY OF PROJECT	5
A6. PROJECT ACTION.....	6
A7. <i>EX ANTE</i> OFFSET PROJECTION	7
A8. PARTIES.....	7
B. METHODOLOGY	9
B1. APPROVED METHODOLOGY	9
B2. METHODOLOGY JUSTIFICATION	9
B3. PROJECT BOUNDARIES.....	10
B4. IDENTIFICATION OF GHG SOURCES AND SINKS.....	11
B5. BASELINE.....	12
B6. PROJECT SCENARIO.....	12
B7. REDUCTIONS AND ENHANCED REMOVALS	12
B8. PERMANENCE	12
C.ADDITIONALITY	13
C1. REGULATORY SURPLUS TEST.....	13
C2. COMMON PRACTICE TEST	13
D. MONITORING PLAN	14
D1. MONITORED DATA AND PARAMETERS	15
E. QUANTIFICATION	15
E1. BASELINE	15
E2. PROJECT SCENARIO.....	17
E3. LEAKAGE.....	17
E4. UNCERTAINTY	17
E5. REDUCTIONS AND REMOVAL ENHANCEMENTS	17
E6. EX-ANTE ESTIMATION METHODS	18
F. COMMUNITY & ENVIRONMENTAL IMPACTS.....	18

F1. NET POSITIVE IMPACTS	18
F2. STAKEHOLDER COMMENTS	19
G.OWNERSHIP AND TITLE	19
G1. PROOF OF TITLE	19
G2. CHAIN OF CUSTODY.....	19
G3. PRIOR APPLICATION	19
H.PROJECT TIMELINE	20
H1. START DATE	20
H2. PROJECT TIMELINE	20

A. PROJECT OVERVIEW

A1. PROJECT TITLE

HT HFC Reclamation Project Georgia 2021

A2. PROJECT TYPE

Industrial Process Emissions - Certified Reclaimed HFC Refrigerants

A3. PROOF OF PROJECT ELIGIBILITY

Table 1: Eligibility Requirements

Criterion	Requirement	Proof of Project Eligibility
Start Date	Non-AFOLU Projects must be validated within 2 years of the project Start Date. AFOLU Projects must be validated within 3 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.	Project start date of February 05, 2021
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
Crediting Period	Version 2.0 of the methodology calls for a crediting period for non-AFOLU projects to be 15 years	Using Methodology 2.0, the crediting period is 15 years
Real	GHG reductions and/or removals shall result from an emission mitigation activity that has been conducted in accordance with an approved ACR Methodology and is verifiable. ACR will not credit a projected stream of offsets on an ex-ante basis.	GHG reductions take place at the displacement of virgin HFC production, which takes place prior to the issuance

Hudson Tech Reclamation Project Georgia 2021

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 shall document that effective control exists over the GHG sources and/or sinks from which the reductions/removals originate	Hudson Technologies holds and retains title to the HFC refrigerant and all environmental rights and benefits from purchase through reclamation until sale of the reclaimed gas for use in the US refrigerant market
Offset Title	Project Proponents 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.	Hudson Technologies demonstrated the title to material purchased via Purchase Order receipts and Terms and Conditions given to customers. Hudson maintains title to all environmental attributes of sold HFCs via Sales Invoices Terms and Conditions, as well as terms publicly available on our website . The title to all offsets is clear, unique, and uncontested
Additional	Every project shall use either an ACR-approved performance standard and pass a regulatory surplus test, or pass a three-pronged test of additionality in which the project must: 1) exceed regulatory/legal requirements; 2) go beyond common practice; and 3) overcome at least one of three implementation barriers; institutional, financial, or technical.	<p>This project passes the Regulatory surplus test and the ACR---approved practice---based Performance test.</p> <p>Regulatory Surplus Test: This project is not mandated by any regulation, existing law, statute, legal ruling, or any other regulatory framework.</p> <p>Practice-Based Performance Standard: A review of US EPA's reclamation data indicates that the HFC refrigerant sector has a low market adoption rate for using certified reclaimed HFCs.</p>

Regulatory Compliance	Projects must maintain material regulatory compliance. To do this, a regulatory body/bodies must deem that a project is not out of compliance at any point during a reporting period. Projects deemed to be out of compliance with regulatory requirements are not eligible to earn ERTs during the period of non-compliance. Regulatory compliance violations related to administrative processes (e.g., missed application or reporting deadlines) or for issues unrelated to integrity of the GHG emissions reductions shall be treated on a case-by-case basis and may not disqualify a project from ERT issuance. 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 non-compliance 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	ACR requires project proponents to assess, account for, and mitigate certain types of leakage, as summarized in relevant sector standards and approved methodologies. Project proponents must deduct leakage that reduces the GHG emissions reduction and/or removal benefit of a project in excess of any applicable threshold specified in the methodology.	Projects using the HFC reclaim methodology would not increase demand for refrigerant beyond current baseline demand, i.e, use of more reclaimed refrigerant would not cause and increase in virgin HFC production (to the contrary), or increase refrigerant emissions rates. Therefore, for this project, "leakage" can be disregarded.

Independently Validated	ACR requires third-party validation of the GHG Project Plan by an accredited, ACR-approved VVB once during each Crediting Period and prior to issuance of ERTs. Validation can be conducted at the same time and by the same VVB as a full verification; however, the deadline for validation is determined by the methodology being implemented and the project Start Date (see above). Governing documents for validation are the ACR Standard, including sector-specific requirements, the relevant methodology, and the ACR Validation and Verification Standard.	This project will be validated and verified by an independent third party, ACR approved VVB
Independently Verified	Verification must be conducted by an accredited, ACR-approved VVB prior to any issuance of ERTs and at minimum specified intervals. ACR requires verifiers to provide a reasonable, not limited, level of assurance that the GHG assertion is without material discrepancy. ACR's materiality threshold is $\pm 5\%$.	This project will be validated and verified by an independent third party, ACR approved VVB
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	There are no negative community or environmental impacts for this project type

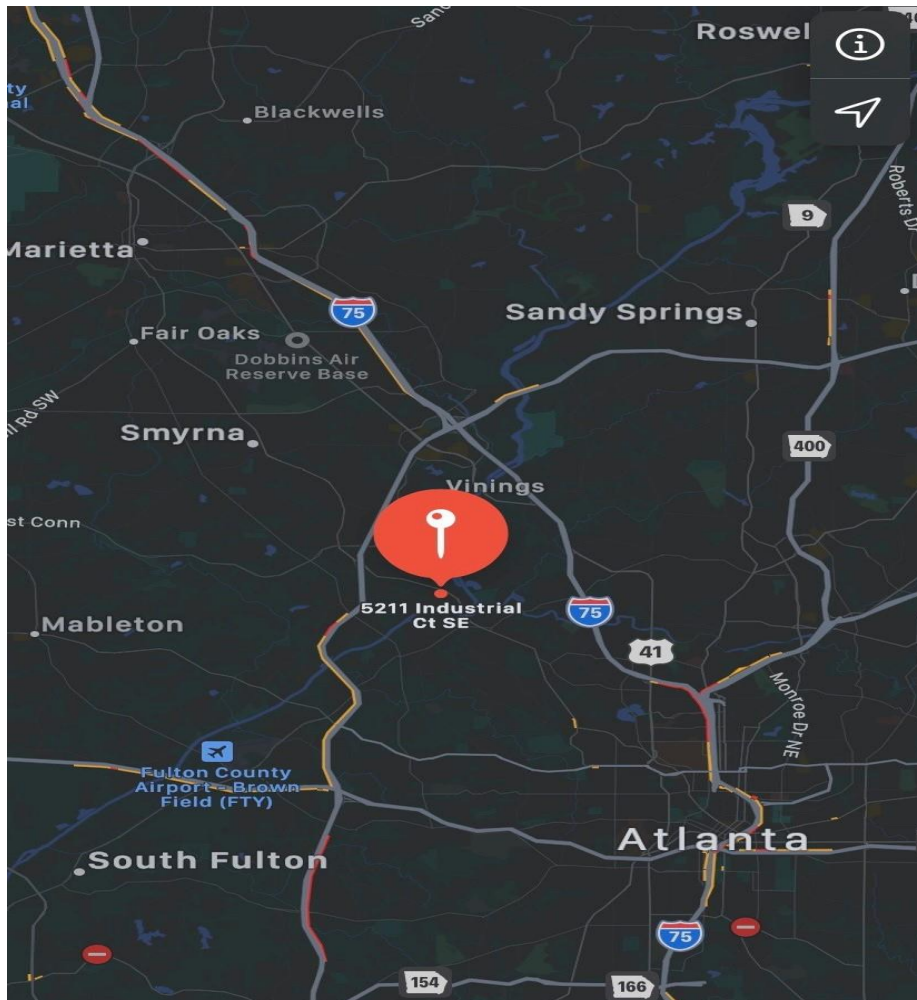
A4. LOCATION

The project location is Hudson Technologies Company located at 5211 Industrial CT SE, Atlanta, GA 30339. Hudson is one of the largest EPA Certified reclaimers in the US and is an industry leader in refrigerant management. All HFC refrigerant reclaimed and reused for this project was sourced from the US refrigerant market.

GPS Coordinates:

Latitude: 33.830940

Longitude: -84.465057



A5. BRIEF SUMMARY OF PROJECT

The Project Activity is the reclamation and use of certified reclaimed HFC refrigerants to service existing refrigeration and air conditioning equipment throughout the US. Hudson Technologies acquired the HFC refrigerants from multiple sources throughout the US refrigerant market. Hudson retained title to the HFC refrigerants starting with the Purchase order, receipt, through processing and subsequent sale.

Background Information:

The use of refrigerant gas has transformed our society since it's inception. Refrigeration is used to process, store, and transport food, for comfort and process cooling, as well as motor vehicle cooling. The most commonly used refrigerants are HFCs. HFCs are safe for the Ozone Layer compared to CFCs and HCFCs but are powerful GHGs when released into the atmosphere. Unfortunately, all refrigeration equipment leaks over time, and all HFCs used in them will eventually reach the atmosphere.

An opportunity to mitigate emissions is by using certified reclaimed refrigerant to charge this refrigeration equipment. The business as usual case is for the sale and use of "Virgin" refrigerant to charge refrigeration equipment. The use of reclaimed refrigerant displaces the need to manufacture new, virgin, refrigerant that will ultimately wind up in the atmosphere.

A6. PROJECT ACTION

Describe the project action(s), including:

- *Description of prior physical conditions*

Prior to the actions taken by Hudson for this project, HFC refrigerants that were used in service would either be vented into the atmosphere, thrown into a landfill, or stored for long periods of time until they could be cleaned up. This project activity includes the processing of spent or "dirty" HFC refrigerants through the process of fractional distillation in order to remove all impurities and bring the material back to AHRI specifications for sale back into the refrigerant market.

- *Description of how the project will achieve GHG reductions and/or removal enhancements*

Hudson Technologies receives HFC refrigerants that are in various levels of purity when compared to the AHRI standard. When HFCs that are received are at a purity level of 99.5%, the gas is run through reclamation equipment that removes any Oil, Moisture, and Impurities so that it can be bulked, packaged and sold. When HFCs are received that are less than 99.5% pure they are run through reclamation equipment to remove Oil, Moisture, and Impurities, but also may be run through a separation tower (Fractional Distillation) if they are contaminated or crossed with other refrigerants. Either way, the end result is 99.5% pure HFCs that are bulked and packaged and sold. The emission reductions are achieved through the resale of reclaimed gas vs the sale of virgin HFC material.

- *Description of project technologies, products, services and expected level of activity*

The project technology is the reclamation of recovered HFCs. Hudson Technologies is the largest approved Refrigerant Reclamation Facility by the US EPA. In the US, the Clean Air Act requires that used refrigerant be processed by an EPA-certified reclaimer and EPA-certified technicians. With patented and proprietary technology, Hudson is an industry leader in refrigerant reclamation services. Hudson processes all recovered

refrigerant and processes it to remove oil, water, and impurities so that it meets specifications for new refrigerant gas.

To ensure that HFC refrigerants are reclaimed to the proper specifications for the refrigerant aftermarket, reclaimed HFC refrigerants in this project are tested to confirm they meet the AHRI 700-2016 Standard for Specification for Fluorocarbon Refrigerants

A7. EX ANTE OFFSET PROJECTION

Quantification of ERs is based on the equations found in version 2.0 of the Methodology. This project will reduce 292,094 tCO₂e.

Table 2: Ex-ante Emission Reductions by Species/Blend using Equations provided by Version 2.0 of the Methodology

Refrigerant Type	Lbs Reclaimed and sold	Annual Consumption (kgs)	15-yr Emission Rate	GWP	Emission Reductions (tCO ₂ e)
R-410a	24,750	11,224	100%	1923	21,153
R-134a	216,615	98,238	100%	1301	125,252
R-404a	63,768	28,920	100%	3945	111,807
R-407c	36,820	16,698	100%	1624	26,576
R-407a	8550	3,878	100%	1923	7,307
					292,094

A8. PARTIES

List full contact information, roles, and responsibilities for project proponent, other project participants, relevant regulator(s) and/or administrators of any GHG Program(s) in which the project is already enrolled, and the entities holding offset and land title (if applicable).

Project Proponent: Hudson Technologies Company

- **Contact:** Jonathan Stack, Director of Sustainability and Carbon Projects, jstack@hudsonotech.com, 802-496-3233
- **Role:** Develop carbon project documentation including GHG Project Plan, Monitoring Report, Incoming HFC PO data, COAs, Sales Data, Management of Verification

Hudson Technologies, along with its sister company Aspen Refrigerants, is the largest reclaimer of refrigerant gas in the United States. Hudson has dedicated professionals around the country whose goal is to make sure refrigerant gas is managed in the most environmentally friendly way possible.

Hudson Technologies is one the largest carbon offset developers under the California Air Resources Board compliance cap and trade program, furthering our goal of safe refrigerant management. Hudson has been involved in the refrigerant market for 30 years servicing Wholesale Distributors, HVAC Contractors, and large End Users throughout the US.

Hudson has purchased, reclaimed, and sold all the quantities of HFCs that make up this project.

Hudson owns the ERTs from this project and is the entity that has registered the project on ACR. Hudson will be responsible for contracting validation and verification services.

B. METHODOLOGY

B1. APPROVED METHODOLOGY

This project will be verified to ACR Standard 7.0 using the ACR methodology *Certified Reclaimed HFC Refrigerants, Propellants, and Fire Suppressants Version 2*.

B2. METHODOLOGY JUSTIFICATION

Describe why the chosen methodology is the most appropriate methodology for the project.

This project tracks source, reclamation, and sale documentation for the use of certified reclaimed HFC refrigerants to quantify emission reductions from displacing the production and eventual emissions of virgin HFC refrigerants. The chosen methodology provides the quantification framework for the creation of carbon credits from the reductions in GHG emissions resulting from the use of certified reclaimed HFC refrigerants. In Table 3, eligible segments and sectors relevant to this project are highlighted.

Project Activity	Refrigerant Sector	Eligible Segments in Sector
Use of Certified Reclaimed HFC refrigerants	Domestic Refrigeration	Residential refrigerators and freezers.
	Commercial Refrigeration, also known as Retail Food Refrigeration	Equipment used to store and display chilled and frozen goods for commercial sale such as in supermarkets, convenience stores, bakeries, and restaurants. This equipment includes centralized supermarket systems, remote condensing units, and stand-alone equipment (e.g., beverage vending machines, stand-alone display cases).
	Cold Storage Warehouses	Storage for meat, produce, dairy products, and other perishable goods.
	Industrial Process Refrigeration	Chemical, pharmaceutical, petrochemical and manufacturing industries, industrial ice machines and ice rinks.
	Transport Refrigeration	Refrigerated truck trailers, railway freight cars, ship holds, and other shipping containers.
	Mobil Air Conditioning	Automobiles, trucks, buses, and other motor

		vehicles.
--	--	-----------

	Stationary Air Conditioning	Comfort cooling for homes and commercial buildings, including multi-family buildings, office buildings, hospitals, universities, shipping malls, airports, sports arenas.
--	-----------------------------	---

B3. PROJECT BOUNDARIES

Physical boundary: The physical boundary is Hudson Technologies at 5211 Industrial CT SE, Atlanta, GA 30339. Hudson Technologies is an EPA certified refrigerant reclaimer. It is the physical and geographical site where the recovered HFC refrigerant is reclaimed in the project for use in equipment operations and servicing/recharging to replace refrigerant that leaks or to charge newly manufactured refrigeration or air conditioning equipment.

The project covers HFCs that were reclaimed, Certified, and Sold back to the US refrigerant market between February 5, 2021 and December 30, 2021.

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

GHG sources and sinks within the project boundaries.

SSR	SOURCE DESCRIPTION	GAS	INCLUDED (I) OR EXCLUDED (E)	QUANTIFI- CATION METHOD
1 HFC Production	Fossil fuel emissions from the production of HFCs	CO ₂	E	N/A
		CH ₄	E	N/A
	HFC leaks during HFC production	HFCs	E	N/A
2 HFC Transport	Fossil fuel emissions from transport of HFCs	CO ₂	E	N/A
		CH ₄	E	N/A
		N ₂ O	E	N/A
	HFC leaks during transport	HFCs	E	N/A
3 Equipment Manufacture and Installa- tion	Emissions of HFCs during manufacture or installation of equipment or system or product "First-Fill Emissions"	HFCs	I	N/A
4 Equipment Operations	Fossil fuel emissions from the operation of the equipment or system	CO ₂	E	N/A
		CH ₄	E	N/A
		N ₂ O	E	N/A
	HFC leaks from the operation of the equipment or system or product	HFCs	I	Equation 1
		CO ₂	E	N/A
5 Service Equipment	Fossil fuel emissions from servicing equipment or sys- tem to replace leaked HFC	CH ₄	E	N/A
		N ₂ O	E	N/A
	HFC emissions from servic- ing equipment or system to replace leaked HFC	HFCs	I	Equation 1
6 Equipment Disposal	Emissions from the disposal of the equipment at end-of- life	HFCs	I	Equation 1

B5. BASELINE

The baseline scenario is the amount of emissions that would take place without the use of certified reclaimed HFC refrigerant. It is equal to the total amount of reclaimed HFC refrigerant produced and the subsequent sale, title-transfer or return to a refrigerant distributor, refrigerant wholesaler, or an end-user for use in refrigeration or air conditioning equipment during the reporting period. In the absence of this project, most of the refrigerant used to recharge the system would have come from virgin HFC production along with some small portion of reclaimed HFCs (current reclamation rate).

According to the methodology, the baseline Virgin HFC Replacement Rate is 2%. This is based on the most recent data provided to the EPA by all the US refrigerant reclaimers.

B6. PROJECT SCENARIO

For this project, refrigerant gas HFCs were recovered from various contractors and either returned to Hudson's wholesale partners (and then sent to Hudson), or sold back to Hudson directly.

Hudson received the recovered HFC refrigerant and reclaimed the refrigerant to AHRI standards at our Atlanta, GA facility for re-sell into the refrigerant aftermarket. Hudson specializes in aggregating, reclaiming, and mixing refrigerants. Their knowledge and expertise includes understanding the relationship between refrigerants, oil, and contaminants, as well as the operation of chiller and refrigerant systems.

Hudson holds title to the reclaimed material from the point of receiving it until it is sold back into the US refrigerant market. According to the methodology, it is assumed that any refrigerant sold or otherwise transferred from the reclaimer to a distributor, wholesaler, service technician, or an end-user that refrigerant will be used. In the case of this project, Hudson Technologies was the buyer of the HFCs, the refrigerant reclamation facility, and the seller of the certified reclaimed gas. The sale of reclaimed refrigerant back to the market displaced the production and eventual emissions of virgin refrigerant gas.

B7. REDUCTIONS AND ENHANCED REMOVALS

All refrigerant that is produced will eventually reach the atmosphere unless destroyed. Currently, there is little incentive to reclaim and reuse HFC refrigerants because of the low costs associated with virgin HFC production. Using reclaimed refrigerant effectively displaces the use – and therefore avoids production and eventual emissions – of virgin refrigerant. Within the existing reclamation industry, there is capacity to significantly increase reclaimed refrigerant use, and this protocol will incentivize other companies to increase their reclamation numbers. Thus, using reclaimed refrigerant would result in a new GHG reduction. Reclaimed refrigerant can be used both to “charge” newly manufactured equipment and systems, and to “charge” systems that leak during normal operations.

B8. PERMANENCE

There is no risk of reversal of GHG removal enhancements for project type.

C. ADDITIONALITY

ACR requires that every project either pass an approved performance standard and a regulatory additionality test, or pass a three-pronged test to demonstrate that the project activity is beyond regulatory requirements, beyond common practice, and faces at least one of three implementation barriers.

C1. REGULATORY SURPLUS TEST

There are no requirements on the quantities of reclaimed HFC refrigerants that must be reclaimed or used for any application. Users are free to use virgin HFC, stockpiled HFC, recycled or reclaimed HFC refrigerant in any amount of their choosing. There are regulatory requirements pertaining to certification of the equipment used to recover ODS refrigerants for servicing equipment and the service technicians that handle ODS refrigerants, as well as certification requirements for refrigerant reclaimers. All of these regulatory requirements that apply to ODS refrigerants must be complied with as part of projects involving HFC refrigerants for this project.

Hudson Technologies is one of the largest refrigerant buyer and seller, and therefore we are constantly monitoring any changes in refrigerant policy from the Federal, State, and local Governments.

Hudson Technologies follows all laws regarding the handling of refrigerants, all of our refrigerant techs that handle refrigerant are required to hold an EPA 608 license, and all of our equipment that is used to process refrigerants follows all local, state and federal requirements.

C2. COMMON PRACTICE TEST

N/A

C3. IMPLEMENTATION BARRIER TEST

N/A

C4. PERFORMANCE STANDARD TEST

The Performance Standard Test to determine whether or not there is a low market adoption rate for certified reclaimed HFC Refrigerant was demonstrated in the protocol by a review of EPAs reclamation data, and by EPA's GreenChill Partnership data. The data provided in the methodology shows that because of the low adoption rate, project activities within the certified reclaimed HFC sector qualify for offset credits created under this Methodology.

Based on the most recent data presented to the U.S. EPA by the various reclaimers, the Virgin HFC Replacement Rate is 2%, which is extremely low when compared to previous generation refrigerants.

D. MONITORING PLAN

- Hudson Technologies receives spent or “dirty” refrigerant from all over the US, removes all impurities to bring material back to AHRI specifications, tests it, packages it, and sells it to the HVAC market. This carbon offset project represents a volume of HFC refrigerants what was reclaimed, certified, and sold to the market.
- Hudson Technologies is the Project Developer, reclaimer, material owner, ERT owner, and will be responsible for all aspects of the development of the project, the monitoring plan consists of incoming, reclamation and sales.
- Jonathan Stack – Project Development, project management – Roles and Responsibilities
 - Gather all Purchase, Reclamation, and Sales Data for refrigerant reclaimed and sold during project reporting period
 - Organize and present data and project documentation to project verifier
 - Work with verifier to clarify and issues, and provide necessary backup data through verification until verifier’s work is complete
 - Present findings to ACR for credit issuance
- Hudson technology retains all buyback, reclaim, and sales data electronically at our Woodcliff Lake, NJ headquarters and Atlanta, GA processing facility. All relevant files will be backed up on project developer’s computer indefinitely.
- Hudson Technologies has a robust QA/QC system that makes sure all weights of received and sold HFCs are accurate:
 - Hudson Technicians check in HFCs being received; each cylinder is weighed on a calibrated scale and given a barcode that can be tracked through the system
 - The weights are checked by Technician, Customer Service, Finance, and ultimately the Customer sending in the gas. Any discrepancies in the process are fixed prior to payment to the customer.
 - COAs on cleaned gas are stored by the Plant’s AHRI Certified Labs
 - Sales records are controlled by Hudson’s Finance Department and available for inspection.
- All refrigerant shipments are documented by Hudson and third parties.
- All data is manually entered at start of process, then automated through rest of the process through Hudson Databases; Purchase Orders, COAs, and Sales Invoices from Finance, Operations, and Sales.
- Hudson’s scales are calibrated quarterly, and documentation is available.
- The Project Manager has developed over 25 projects generating over 4 million emission reduction credits.
- Hudson maintains all receipts of recovered HFCs, processing reports, and sales reports. These reports are generated by the Purchase Order and are pulled on a monthly basis. Data is Retained indefinitely.
- Sampling Method – N/A

D1. MONITORED DATA AND PARAMETERS

<i>Data or Parameter Monitored</i>	$VR_{hfc,j,rp}$
<i>Unit of Measurement</i>	Kg
<i>Description</i>	Total quantity of virgin HFC refrigerant that would have been used to recharge equipment during the reporting period, derived from the quantity of monitored certified reclaimed HFC refrigerant that is documented according to the Methodology
<i>Data Source</i>	Hudson's operating records
<i>Measurement Methodology</i>	Hudson weighs the individual containers of reclaimed HFC refrigerant using calibrated weight Scales
<i>Data Uncertainty</i>	Low
<i>Monitoring Frequency</i>	Determined once for each project (which consists only of one reporting period)
<i>Reporting Procedure</i>	Purchase Orders and receiving records, production records from reclamation, and sales records of certified reclaimed gas
<i>QA/QC Procedure</i>	Multiple checks are conducted company wide on all aspects of the purchase, reclamation, and sales of reclaimed material.
<i>Notes</i>	N/A

E. QUANTIFICATION

E1. BASELINE

The baseline emissions are the emissions that would take place without the use of certified reclaimed HFCs. It is equal to the amount of HFC refrigerant reclaimed and the subsequent sale, title transfer or return to a refrigerant distributor, refrigerant wholesaler, or an end-user for use in refrigeration or air conditioning equipment during the reporting period. In the absence of the project, most of the refrigerant used to recharge the system would have come from virgin HFC production, and some would come from HFCs that would normally be reclaimed. The baseline calculation takes into consideration the 2% estimated, current Virgin HFC Replacement rate.

The baseline emissions are calculated as follows:

$$BE_{HFCrp} = \sum[(VR_{HFC,j, rp} \times GWP_{HFC,j})] \times (1 - RR_{BL}) \div 1000$$

$BE_{HFC,j, rp}$ = Baseline emission during the reporting period (tonnes CO₂e)

$VR_{HFC,j, rp}$ = Total quantity of virgin HFC refrigerant used to recharge equipment during the reporting period (kgs)

$GWP_{HFC,j}$ = Global warming potential of HFC refrigerant

RR_{BL} = Baseline Virgin HFC Replacement Rate (% per year). This is the percentage of HFC that would be reclaimed in the business-as-usual case, currently estimated to be 2% per year.

Baseline is 292,094 tCO₂eq

2021 Georgia R-134a Reclamation

Parameter	Value
$BE_{HCF,j, rp}$	125,252 tonnes CO ₂ e
$VR_{HFC,j, rp}$	98,238 kgs
$GWP_{HFC,j}$	1,301
RR_{BL}	2%

2021 Georgia R-410a Reclamation

Parameter	Value
$BE_{HCF,j, rp}$	21,153 tonnes CO ₂ e
$VR_{HFC,j, rp}$	11,224 kgs
$GWP_{HFC,j}$	1,923
RR_{BL}	2%

2021 Georgia R-404a Reclamation

Parameter	Value
$BE_{HCF,j, rp}$	111,807 tonnes CO ₂ e
$VR_{HFC,j, rp}$	28,920 kgs
$GWP_{HFC,j}$	3,945
RR_{BL}	2%

2021 Georgia R-407c Reclamation

Parameter	Value
$BE_{HCF,j, rp}$	26,576 tonnes CO ₂ e

$VR_{HFC,j,rp}$	16,698 kgs
$GWP_{HFC,j}$	1,624
RR_{BL}	2%

2021 Georgia R-407a Reclamation

Parameter	Value
$BE_{HCF,j,rp}$	7,307 tonnes CO ₂ e
$VR_{HFC,j,rp}$	3,878 kgs
$GWP_{HFC,j}$	1,923
RR_{BL}	2%

E2. PROJECT SCENARIO

By using previously used, reclaimed HFC refrigerants, this project displaces new production of virgin HFC. Any project related emissions from using reclaimed refrigerant, for example, from transport of certified reclaimed HFCs, are considered negligible and outside the project boundary. Project emissions can be disregarded. The baseline emissions for the reporting period equal the project emissions reductions.

E3. LEAKAGE

Projects involving certified reclaimed HFC refrigerant would not increase demand for refrigerant beyond current baseline demand, i.e., use of more reclaimed refrigerant would not cause an increase in virgin HFC production or increase refrigerant emission rates. For this project, leakage can be disregarded.

E4. UNCERTAINTY

For the purposes of this methodology, it is assumed that from the time any reclaimed HFC refrigerant is sold or otherwise transferred from the reclaimer to a distributor, wholesaler, service technician, or an end-user that refrigerant will be used. There is no ex post uncertainty accounted for in this methodology.

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Project emission reductions during reporting period equals baseline emissions of HFC refrigerant during reporting period.

$$ER_{rp} = BE_{HFCrp}$$

Parameter	Value
ER_{rp}	292,094 tonnes CO ₂ e
BE_{hfcrp}	292,094 tonnes CO ₂ e

E6. EX-ANTE ESTIMATION METHODS

N/A.

F. COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

Positive community impacts from the project include the reduction of emissions and economic benefit to refrigerant recovery technicians/contractors, transportation companies, and the communities around the reclamation facility. HFC refrigerants are the ozone friendly alternative to CFC and HCFC refrigerants, but HFC refrigerants are powerful greenhouse gases. Currently, there is no phase out plan proposed for reducing the production of HFC refrigerants. As discussed, there is currently no incentive to reclaim and reuse HFC refrigerants because of the low costs associated with purchasing virgin from the producers.

Because all HFC refrigerants produced eventually reach the atmosphere, decreasing virgin production creates an emissions reduction. The purpose of this methodology is to transition the refrigerant industry from using virgin HFC refrigerants to using reclaimed HFC refrigerants. This HFC reclamation project supports United Nations (UN) SDGs 9 (Industry, Innovation and Infrastructure), 12 (Responsible Consumption and Production), and 13 (Climate Action).

SDG Goal 9 – Industry, Innovation, and Infrastructure – is met, because the use of reclaimed refrigerant effectively displaces the use and avoids the production and eventual emissions of virgin refrigerant. The industry has little incentive to use reclaimed refrigerant because of abundantly and cheaply available virgin HFC refrigerants. There is capacity to significantly increase reclaimed refrigerant use in the refrigeration reclamation industry.

SDG Goal 12 – Responsible Consumption and Production – is met because the Project enables the end use of reclaimed HFC refrigerants to service existing and newly manufactured refrigeration and air conditioning equipment.

SDG Goal 13 – Climate Action – is met because the use of reclaimed refrigerant effectively displaces the use and avoids the production and eventual emissions of virgin refrigerant. HFC refrigerants are powerful GHGs, which contribute significantly to total GHG emissions, and thus anthropogenic climate change. The reclamation and use of reclaimed HFC refrigerant is undertaken voluntarily by all parties with the purpose of reusing existing supplies of HFC refrigerants, reducing GHG emissions, and reducing the impacts caused by refrigerant gas emissions.

There are no negative community or environmental impacts for this project.

F2. STAKEHOLDER COMMENTS

Not applicable for this project type.

G. OWNERSHIP AND TITLE

G1. PROOF OF TITLE

Hudson Technologies retains title to all environmental attributes of HFCs sold by Hudson to the US Refrigerant market per the Terms and Conditions on our Sales Invoices, as well as on our website:

<https://www.hudson-tech.com/terms-of-sale/>

G2. CHAIN OF CUSTODY

The offsets from this project have not been bought or sold previously. There is no forward option contract for the offsets from this project.

G3. PRIOR APPLICATION

Hudson has not applied for GHG emission reduction or removal credits for this project through any other GHG emissions trading system or program.

H.PROJECT TIMELINE

H1. START DATE

The reporting period start date for this project is February 05, 2021. The reporting period begins on the date that the initial volume of refrigerant is sold, title transferred, returned to a distributor, wholesaler, or end user for use in refrigeration equipment. The reclaimed HFCs were sold to various participants in the US refrigerant market between February 05, 2021 and December 30, 2021

H2. PROJECT TIMELINE

- *Initiation of project activities*
February 5, 2021
- *Project term*
February 5, 2021 – December 30, 2021
- *Reporting period*
February 5, 2021 – December 30, 2021
- *Crediting Period*
February 5, 2021 – February 4, 2036
- *Frequency of monitoring, reporting and verification*
Once during the reporting period
- *Relevant Project Activities in each step of GHG project cycle:*
 - Collection of used refrigerants from the US Market
 - Reclamation of used refrigerant collected, removal of oil, moisture, and impurities.
 - Returning used refrigerant back to its original AHRI specifications
 - Cleaned refrigerant is placed in bulk tanks where it is tested to make sure it is 99.5% pure and meets all necessary specifications.
 - Cleaned, tested refrigerant is then packaged in various sized cylinders for sale.
 - Refrigerant is sold to HVAC customers around the US.
 - Data for Refrigerant purchased, reclaimed, and sold is collected and presented to project verification body along with other relevant project documentation.
 - Verification body reviews data against protocol during verification, performs a site visit, and works with project developer to clarify any data.
 - Verification body completes their work and it is presented to ACR for review and ultimate issuance of carbon credits.