ACR Project Plan

Foam Blowing Agent Project 003F

May 2022

foam supplies, inc.

GCC

Global Chemical Consultants

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PROJECT OVERVIEW

A1. PROJECT TITLES

Foam Blowing Agent Project 003F

A2. PROJECT TYPE

Industrial Process Emissions

A3. PROOF OF PROJECT ELIGIBILITY

This Project is eligible under the "Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from the Transition to Advanced Formulation Blowing Agents in Foam Manufacturing and Use, Version 2.0". Certain project eligibility requirements are specified within the Methodology and others are specified within the ACR Standard, Version 7.0. Methodology version 3.0 allows for second issuance of ERTs for 2019 and 2020 projects using the updated quantification equations in version 3.0.

This project covers activities for operating and reporting for vintage year 2020.

Table 1 – Project Eligibility Criteria

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Geographic location	The Project must be located in North America	This Project is based on the avoidance of high-GWP emissions from blowing agents used in the production of XPS Boardstock, at a facility in Winchester, VA which is owned and operated by the Project Partner.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Eligible Foam Application	The Project must be in one of the following foam applications: 1. XPS boardstock 2. Two-component rigid PU spray foam 3. Rigid PU injected foam a. Marine flotation or buoyancy b. HVAC and air handling systems c. Refrigerated transport d. Small retail food refrigeration e. Large retail food refrigeration f. Industrial refrigeration systems g. Garage and entry doors 4. Rigid PUF residential refrigerators and freezers	The Project is in the XPS Boardstock application.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
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 January 1, 2020. The Project is being developed under version 2.0 of the FBA Methodology which was published in 2018. Methodology V3.0 allows for second issuance of ERTs for 2019 and 2020 projects using the updated quantification equations in V3.0.
Minimum Baseline BA Usage	Other than for projects which use a Default BA, records of the Baseline BA used in the Project must show a minimum of 2 years of usage of a BA with a GWP >30 prior to the Project Activity.	Not applicable because a Default BA is used for these projects.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Default BA	For foam applications required to transition to a different BA as the result of a regulation, the Default BA will be the BA that the project developer would have used instead of the Eligible BA. In these scenarios, the Default BA becomes the Baseline BA. The GWP of a Default BA may be used if it can be demonstrated that the Default BA is the alternative most likely to be used upon transition. Project proponents shall provide documentation, which shall include financial, market and/or technical analyses, to justify the use of the Default BA.	HFC-134a is the Default BA for the XPS Boardstock industry. Documentation is provided showing that when the industry was no longer allowed to use HCFC-142b after January 1, 2010 due to the EPA SNAP regulations, the replacement BA was HFC-134a.
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	The Crediting Period for non-AFOLU projects shall be ten (10) years.	This is a non-AFOLU project, therefore the Crediting Period is Leakage Lifetime for XPS Boardstock foam application, which is 25 years.
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 replacement of Baseline BA in the manufacturing process during the reporting period. 100% of BA in the foam product is emitted during the Leakage Lifetime, which includes manufacturing, use, and end of life.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
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 Foam Supplies International ("FSI"). The Project Partner owns and operates the plant site involved and has control over the GHG sources/sinks from which the emission reductions originate. Documentation showing effective control of the GHG sources from which the reductions originate is maintained.
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.	The Project Partner and Foam Supplies have entered into an agreement with respect to title and ownership of the carbon credits generated here. The title is clear, unique and uncontested. No offsets have been sold in the past.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Additional	The Methodology requires Projects to pass the Regulatory Surplus Test and meet the ACR Practice-Based Performance Standard. <u>Practice-Based Performance Standard:</u> The Methodology has already completed a market adoption analysis. Therefore, project proponents must only show that their project falls into one of the Eligible Foam Applications found in Table 1 of the Methodology to pass the Practice-Based Performance Standard. <u>Regulatory Surplus Test:</u> 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.	The Project passes the ACR-approved Practice-Based Performance Standard and the Regulatory Surplus Test. <u>Practice-Based Performance Standard:</u> The Project falls into the Eligible Foam Applications in Table 1 of the Methodology. <u>Regulatory Surplus Test:</u> 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 BA to the Project BA.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
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.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
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 BA with a GWP greater than 30 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, because all equipment was either reused, decommissioned, or destroyed. An 8" secondary extruder was replaced with a 10" extruder. The original 8" extruder was decommissioned. A secondary cooling system was installed and the old cooling system was decommissioned. Existing tankage from the two prior blowing agents was refurbished and re-used for the new blowing agents and existing tankage which was not being used at the plant was also refurbished and placed into service. The remainder of the Baseline foam manufacturing equipment is used in the Project.
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.

Criterion	ACR Standard or Methodology Specific Requirement	Proof of Project Eligibility
Environmental & Community Assessment	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, including reduced localized GHG emissions for combating climate change. Potential negative impacts were considered; none were found to exist.

A4. LOCATION

The Project is located at a manufacturing facilitiy owned and operated by the project partner/XPS board manufacturer.

Table 2 – Project Location

Project	Location	GPS Coordinates
003F	Kingspan manufacturing facility 200 Kingspan Way Winchester VA 22603	Latitude - 39.212787 Longitude - -78.140479

A5. BRIEF SUMMARY OF PROJECT

Description of Project Activity

The Project Activity is the transition from a non-Eligible BA (Baseline BA), to methyl formate, an Eligible BA (Project BA) on an extruded polystyrene (XPS) production line at a manufacturing Facility in Winchester, Virginia. Foam Supplies (FSI) is the Project Proponent.

XPS is produced on extruding machines in the form of continuous foam billets. In the extruder the polystyrene is melted, BAs are then introduced, and the mixture is extruded through a

nozzle with wide slit to create a foam billet. After running through a cooling zone the billet is sent to a forming machine where they are cut to the customer's specifications.

Background Information

BAs are a key ingredient in the production of XPS Boardstock. These BAs contain chemicals that release GHGs during manufacture, use, and end-of-life (destruction). The Montreal Protocol has taken action to limit the use of high-GWP BAs and over the years and the US EPA implemented the Significant New Alternatives Program (SNAP) to work with and guide industry in these transitions. As a result, the majority of BAs currently in the market today are HFCs. HFCs, while safer for the ozone compared to CFCs and HCFCs, are still powerful GHGs when released into the atmosphere.

An opportunity to reduce emissions beyond regulatory compliance is by replacing HFC BAs with next generation BAs that have near-zero GWP and near-zero ODP.

Project Purpose(s) and Objective(s)

The purpose of the Project is to offset the GHG emissions that would have been produced by the manufacturing and use of foams with HFC BAs by transitioning to methyl formate, a near-zero GWP and zero-ODP BA.

A6. PROJECT ACTION

Description of prior physical conditions

The plant has been manufacturing foam for many years and have historically used CFCs, and HCFCs as BAs. Prior to the transition to methyl formate it was using a blend of HCFC-142b and ethyl chloride as the BA for the XPS boardstock manufacturing process. The XPS industry transitioned to HFC-134a when the SNAP rules no longer permitted the use of HCFC-142b. The owner and operator of the plant chose to go above and beyond regulatory requirements by incorporating methyl formate, an Eligible BA, into their manufacturing process.

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

The plant owner and operator at that time chose not to transition all of its BA usage to the Baseline BA (HFC-134a) and opted to replace a percentage of it with methyl formate, an Eligible BA. The voluntary transition of Kingspan to an Eligible BA in their foam production results in a reduced amount of GHG in the manufacturing and use of the foam produced. This Project measures the amount of Eligible BA used by Kingspan in against the amount of Baseline BA (HFC-134a) that would have been used to produce the same quality of foam product. In

addition to the low-GWP value of methyl formate, it also has a different molecular weight and chemical structure than the Baseline BA and, therefore, less methyl formate is needed to produce the same quality of foam.

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

Methyl formate manufactures the foam in extrusion processes on a daily basis. Therefore, this project activity is ongoing throughout the year as they produce the XPS boardstock.

- ***Methyl formate***: A low-GWP BA
- ***Foam manufacturing equipment***: Equipment located at Kingspan that produces the foam product. The equipment consists of an electronic control panel, extrusion dies and conveying lines that extrude finished XPS boardstock products.

A7. EX-ANTE OFFSET PROJECTION

Table 3 – Offset Volume Estimates

Project	Location	Vintage	Total ERTs[1] (metric tonnes CO2e)
Foam Blowing Agent Project 003F 100% Emission Rate	**North America**	**2020**	**1,934,327**
Foam Blowing Agent Project 003F ERTs First Issuance	**North America**	**2020**	**614,148**
Foam Blowing Agent Project 003F Outstanding ERTs to be Issued	**North America**	**2020**	**1,320,179**

Emission reductions created from this Project are calculated using the Default BA (HFC-134a) and the Project BA (methyl formate) GWP values and the pounds of methyl formate used during the Reporting Period. The equations in the Methodology calculate the GHG reductions in in the Leakage Lifetime of XPS boardstock product (25 years). There is only one Reporting Period for this Project that will issue all ERTs upon final Verification.

[1] *Total offsets created reflects the Methodology calculation that allows for 100% of reductions to be issued as ERTs upon Verification.*

ACR has granted a "Forward Crediting Policy Revision" in relation to the Methodology. The revision states the following: "A foam blowing agent transition project must result from an action that has already occurred (the transition to an advanced formulation blowing agent) and that action must be verifiable. In order to quantify avoided emissions associated with the transition to an advanced formulation blowing agent, it is necessary to utilize modeled emission rates over a 25-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 25 years of avoided emissions. The emission rates found in the Methodology are derived from IPCC sources and were accepted for use in the ACR methodology development process.

ACR's forward crediting prohibition shall not apply to foam blowing agent transition projects utilizing ACR's Emission Reduction Measurement and Monitoring Methodology for the Transition to Advanced Formulation Blowing Agents in Foam Manufacturing and Use, Version 2.0"

A8. PARTIES

Kingspan Insulation LLC – Project Partner/ XPS Board Manufacturer

The Kingspan Group was founded in 1972 as a small family business in the Republic of Ireland. The Group was initially involved in manufacturing metal cladding and roll-formed structural sections. During the early 80s and 90s, the Group expanded into manufacturing insulated panels and insulation products, and established manufacturing plants in the U.K., Ireland and throughout Europe. Kingspan entered the North American market in 2007.. Today they reach a global market, with manufacturing, distribution and commercial operations throughout Europe, the United States, Australia, New Zealand and the Far East.

Contact information:
Address: 200 Kingspan Way, Winchester, VA 22603

Foam Supplies, Inc. – Project Proponent

FSI manufactures and supplies the chemicals (including the BAs) used by foam manufacturing facilities to manufacture foam products. FSI has been in business since 1970 and has 2 manufacturing facilities in the U.S., 3 international offices, technology partners and distributors in 17 countries, and customers around the world. They are one of the largest independent polyurethane systems suppliers in the United States. FSI has created a unique account through which emission reduction credits will be recognized sold and transferred.

Contact Information:

Address: 13389 Lakefront Drive, Earth City, MO 63045
Phone: 314.344.3330
Website: www.foamsupplies.com

Global Chemical Consultants LLC (GCC) – Project Management

GCC is a global chemical consulting firm founded in May 2012.

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B.
METHODOLOGY

B1. APPROVED METHODOLOGY

The Project is submitted under the approved methodology entitled "Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from the Transition to Advanced Formulation Blowing Agents in Foam Manufacturing and Use, Version 2.0." Quantification for End of Life issuance of ERTs will use version 3.0.

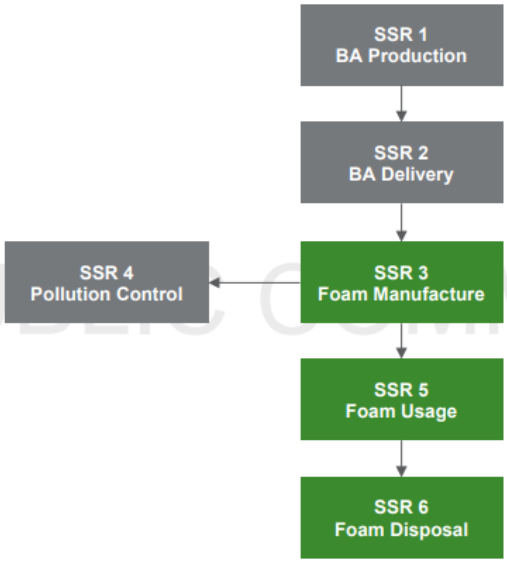
B2. METHODOLOGY JUSTIFICATION

The Project involves the transition of XPS Boardstock manufacturing from a high-GWP BA (Default BA) to a low-GWP and low-ODP BA (Eligible or Project BA). The chosen methodology provides the quantification framework for the creation of carbon credits from the GHG reductions resulting from these activities.

B3. PROJECT BOUNDARIES

The physical boundary for this Project is the XPS manufacturing facility with a mailing address listed in Table 4 and as shown in the process flow diagram (Figure 2 in Section D). The temporal boundary for this Project is January 1st 2020 through December 31st 2020. The physical boundary for the use phase of this project is North America. The temporal boundary for the use phase of this Project is January 1st 2020 through December 31st 2020. See Figure 1 for an illustration of the Project boundary.

Figure 1 – Illustration of the Project Boundary



All SSrs in green are included and must be accounted for under this Methodology. SSRs in gray are not included under this Methodology.

Table 4 – Project Physical Boundaries

Project	Location	GPS Coordinates
Foam Blowing Agent Project 003F	200 Kingspan Way Winchester VA 22603	Latitude - 39.212787 Longitude - -78.140479

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

Table 5 – GHG Sources and Sinks

SSR	SOURCE DESCRIPTION	GAS	INCLUDED (I) OR EXCLUDED (E)	QUANTIFICATION METHOD
1 BA Production	Fossil fuel emissions from the production of the BA.	CO_2	E	N/A
		CH_4	E	N/A
		N_2O	E	N/A
	Emissions from the production of the BA.	HFC or Low GWP BA	E	N/A
2 BA Delivery	Emissions from the delivery of the BA to the project site.	HFC or Low GWP BA	E	N/A
	Fossil fuel emissions from the delivery of the BA to the project site.	CO_2	E	N/A
		CH_4	E	N/A
		N_2O	E	N/A
3 Foam Manufacture	Emissions from the manufacture of the foam using a BA in the baseline and project.	HFC or Low GWP BA	I	Equations 1, 2 & 3
4 Pollution Control	Fossil fuel emissions from air pollution control equipment used in the baseline and project.	CO_2	E	N/A
		CH_4	E	N/A
		N_2O	E	N/A
5 Foam Usage	Emissions from the use of the foam in the baseline and project.	HFC or Low GWP BA	I	Equations 1, 2 & 3

SSR	SOURCE DESCRIPTION	GAS	INCLUDED (I) OR EXCLUDED (E)	QUANTIFI-CATION METHOD
6 Foam Disposal	Fossil fuel emissions from the transport of the foam to EOL.	CO_2	E	N/A
		CH_4	E	N/A
		N_2O	E	N/A
	Emissions from the equipment used to destroy the foam at EOL	CO_2	E	N/A
		CH_4	E	N/A
		N_2O	E	N/A
	Emissions from the foam at EOL (e.g. landfill, shredding, incinera-tion, etc.) including post disposal	HFC or Low GWP BA	I	Equations 1, 2 & 3

B5. BASELINE

The baseline scenario is the use of HFC-134a as the Default BA in the manufacturing of XPS boardstock products. HCFCs were phased out under the SNAP regulations in 2003 and 2007 and gave rise to the use of HFCs. Prior to the 2010 phase out of HCFCs, the XPS industry primarily used HCFC-142b and HCFC-22. The plant was using HCFC-142b prior to the transition.

The information available through research, industry publications, and the EPA SNAP 20 rulemaking process shows that the XPS industry had limited HFC options to consider (basically HFC-134a and HFC-152a) and that HFC-134a was clearly the BA of choice to replace HCFC-142b after the 2010 transition.

The baseline will be calculated using the formula described in Equation 1 of the methodology version 3.0.

B6. PROJECT SCENARIO

The Project Scenario is the actual amount of Project BA being used by each Project to manufacture XPS boardstock in the same application to produce the same thermal quality of boardstock as in the Baseline Scenario.
Project emissions are calculated using equation 3 of version 3.0 of the methodology.

B7. LEAKAGE CALCULATION

Leakage emissions are calculated using equation 4 of version 3.0 of the methodology.

B8. REDUCTIONS AND ENHANCED REMOVALS

This Project is based on a simple premise of product replacement and mass-balance. The Baseline BA has a high GWP that produces a significant amount of GHG during the manufacturing, use, and end of life of the boardstock product. The Project BA has a low GWP and produces significantly less GHG during the manufacturing and use of the boardstock product. Baseline BA GHG emissions minus Project BA GHG emissions equals the Project emission reductions and are calculated using equation 5 of version 3.0 of the Methodology.

B9. PERMANENCE

There is no risk of reversal. Once the boardstock product is produced with the Eligible BA, the product is made and the associated GHG reductions are fixed.

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
2. Performance Standard Test

C1. REGULATORY SURPLUS TEST

In order 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.

In 2015, EPA took action to restrict the allowable blowing agents in foam manufacturing. Several different transition dates were specified. EPA has allowed the use of several blowing agents with high GWP, including HFC-134a, HFC-245fa (HFC-152a is not restricted though it has a GWP of 124). The July 20, 2015 Federal Register contains an amended Appendix U to Subpart G to 40 CFR Part 82, which is a compilation of the dates by which higher GWP BAs must be phased out and replaced by a lower GWP BA. This Appendix makes clear that HFC-134a was allowed to be used in these end uses until 2020. Thus, during 2020, EPA did not have any requirement to use low-GWP BAs. No state applicable to this project has adopted any requirement to eliminate the use of HFCs for this end use.

Further, ECCC (the Canadian agency with environment and climate change authority) has adopted regulations with respect to the use of HFCs which are similar to those adopted for the US. Those regulations also do not prohibit the use of HFCs during the project term or for the end uses addressed in this Project.

The Project is not mandated by any 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. However 3 states have passed legislation that will go into effect for XPS on 1/1/2021.

California SB 1013, passed September 2018, sets the start date for the elimination of HFCs in **spray foam** to be January 1st 2020 , and **January 1, 2021 for XPS** in California. As such, this legislation does not impact this project for the 2020 calendar year.

Washington State HB 1112, passed July 28 , 2019, sets the start date for the elimination of HFCs in **spray foam** to be January 1st 2020 , and **January 1, 2021 for XPS** in Washington. As such, this legislation does not impact this project for the 2020 calendar year.

New Jersey A5583 , passed January 21, 2020, sets the start date for the elimination of HFCs in **spray foam** to be July 1st 2020 , and **January 1, 2021 for XPS** in New Jersey. As such, this legislation does not impact this project for the 2020 calendar year.

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 Foam Applications found in Table 1 of the Methodology to pass the Practice-Based Performance Standard.

The Project falls into an Eligible Foam Application listed in Table 1 of the Methodology.

D.
MONITORING PLAN

D1. MONITORED DATA AND PARAMETERS

Data or Parameter Monitored	**Q_{EBA}**
Unit of Measurement	Pounds
Description	Quantity of Eligible BA used in the Project
Data Source	The plant's BA flow meter records.
Measurement Methodology	Flow meter records showing the pounds of Project BA used by the project partner in the manufacturing of XPS boardstock
Data Uncertainty	High level of certainty
Monitoring Frequency	Flow meter data is recorded at the beginning and end of each product run, through a totalizer report.
Reporting Procedure	Flow meter data [for lines E6 and E7] are reported from the totalizer reports into SAP to produce a "Goods Issue Report" In addition, a manual "Data Capture Report" is completed to the end of each run.
QA/QC Procedure	Flow meter volumes are compiled and compared to a daily reading off the methyl formate tank. Kingspan's BA purchase orders are also compared to the production data reports on an annual basis. The flow meters on line E6 and E7 were checked for calibration accuracy in August 2017. The manufacturer does not suggest ongoing flowmeter calibrations since there are no moving parts.

Data or Parameter Monitored	**BAR**
Unit of Measurement	%
Description	BA Ratio – The quantity of Eligible BA, as compared to the Baseline BA, that is required to replace the Baseline BA to produce a foam with equivalent thermal performance. Cyclopentane is not an eligible BA so it is not included in the BAR calculation
Data Source	The molecular weight (MW) of each BA as determined by its chemical formula. HFC-134a = 102.03 Methyl formate = 60.05
Measurement Methodology	BAR = Baseline BA MW / Project BA MW. Gas volume is determined by the number of molecules present, not the weight. One of the important properties of polyurethane foam is density. The density is determined by the amount of BA used since the calculation is weight per volume. To achieve the same density, the same volume of gas is needed and thus the same number of blowing agent molecules must be used. Therefore, a foam that needs one mole of blowing agent gas would need either 102.03 grams of HFC-134a or 60.05 grams of methyl formate. In other words, 1.699 grams of HFC-134a vs. 1.0 grams of methyl formate to generate the same volume of foam. Without the use of methyl formate, the ratio between HFC and cylcopentane woud be 90-95% HFC-134A to 5-10% cyclopentane.
Data Uncertainty	High level of certainty.
Monitoring Frequency	Once, at the beginning of Project.
Reporting Procedure	NA
QA/QC Procedure	N/A

Data or Parameter Monitored	Q_{LBA}
Unit of Measurement	Pounds
Description	Quantity of BA that is shifted to the new location that results in activity shifting leakage.
Data Source	The project partner identified any equipment modified, replaced, or decommissioned as a result of the Project Activity. No equipment was moved for use in manufacturing XPS Boardstock outside of the project boundaries.
Measurement Methodology	Leakage will be calculated for any equipment identified by Kingspan maintenance records as being moved for use outside of the project boundaries to a new foam production process created as a direct result of the availability of said equipment. There is no leakage in this transition.
Data Uncertainty	High level of certainty.
Monitoring Frequency	Throughout the project, whenever any maintenance or service changes or removes a piece of equipment.
Reporting Procedure	The project partner maintains electronic records and purchase orders for any maintenance or service work performed.
QA/QC Procedure	NA

Monitoring Plan

Provide the personnel names and roles/responsibilities for each party involved in monitoring the offset project:

- Gregory Geaman, Wilson Geaman, (GCC), supervised the assembly of data used to monitor the offset project.
- Richard Wenham, Director or Purchasing, Kingspan– responsible for the Project Activities at Kingspan, including ordering of BAs, processing invoices, and QA/QC of foam product.
- Sharon Ayers, Customer Relations Manager, Foam Supplies - retrieved the FSI data used for monitoring the project.

Provide a description of the GHG management system employed including the location and recordkeeping/retention requirements for all stored data:

- BA usage is recorded by the BA flow meters as the BA flows from the storage tank to the XPS extruding machine.

- The BA usage records are maintained on file since 2015. The electronic spreadsheets are updated throughout the year and maintained on Kingspan's computer server indefinitely

Methods used to generate data:

- BA usage monitored by the BA flow meters that measure the amount of BA used by the XPS forming machine.

Transfer points and methods of non-automated transfer of data:

- The Goods Issue report is a non-automated transfer of data and the Data Capture report and the daily reading of the methyl formate tank are non-automated.

Describe any calibration procedures and the frequency with which calibration and other maintenance requirements are performed:

- The BA flow meters do not require ongoing maintenance.

Describe the internal audit and other quality assurance/quality control procedures:

- Flow meter volumes are compiled and compared to Kingspan's BA purchase orders on an annual basis.

Sampling methods utilized and performed during the reporting period:

- Sampling is not required under the Methodology.

Foam application in the baseline and the project

The equipment that used the Baseline BA and the Project BA are two XPS Boardstock extrusion machines. Both only produce XPS Boardstock; one line has been in operation at the facility since the 1980s and another line was put into service in 2017.

Additionally, the project partner has continued to maintain Production Reports on file and have maintained these for years prior Project Start Date. These records identify the materials produced on the XPS Boardstock extrusion machine and the materials used in the production, including BAs.

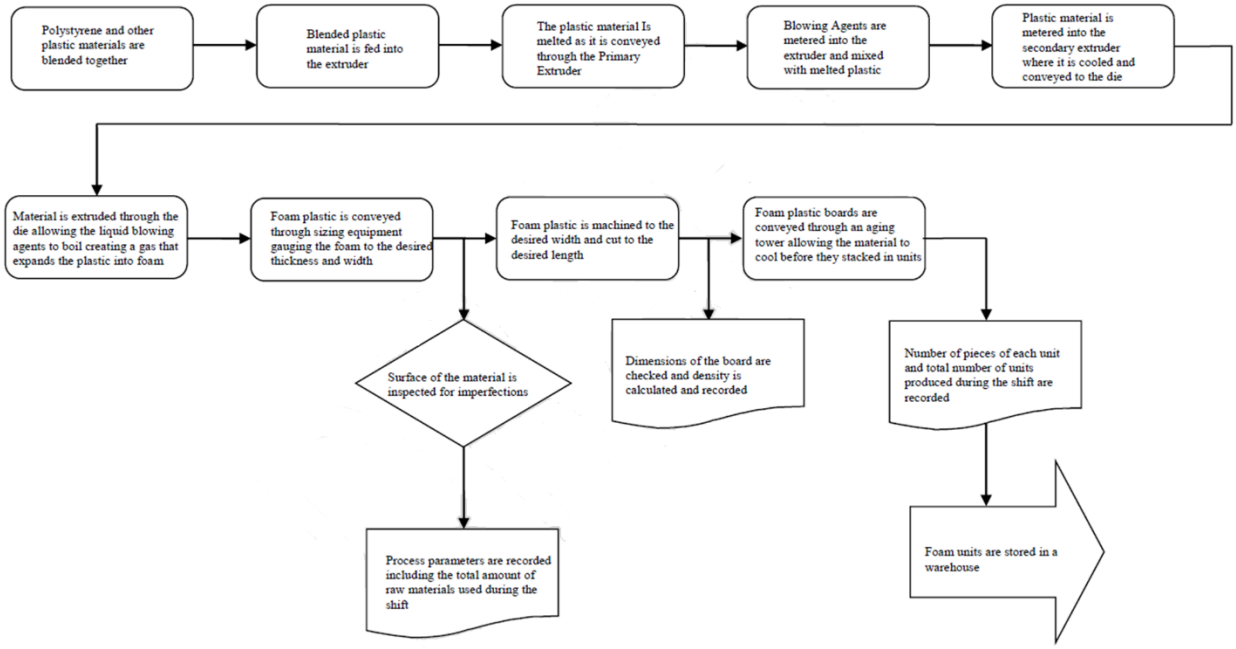
Equipment log for all equipment used

The manufacturing plant has dedicated tanks for each blowing agent used. Blowing Agents are delivered to the plant by commercial carriers. Methyl formate is delivered to a designated dedicated storage tank at the North side of the plant. HFC-134a is delivered to a designated

dedicated tank at the West side of the plant, and cyclo-pentane is delivered to two designated dedicated connected tanks on the North side. Each tank is clearly identified and has it's own dedicated off load station.

Each BA is hard-piped to an extruder (either E-6 or E-7). The BAs are then injected into the extruder with the solids required and then blended/mixed according to the particular formulation and specifications for the particular product being produced. The formed product is conveyed from the extruder press by rollers, cooled and trimmed, before being off-loaded, cooled and prepared for packaging and distribution.

Figure 2 – Process Flow Diagram



Default BA

To determine the Default BA for the XPS application, industry data, a market survey and other relevant information was used.

On January 1, 2010 HCFC-142b was no longer allowed for use as a BA under the EPA SNAP regulations. Prior to that date, XPS boardstock manufacturers in North America primarily used HCFC-142b and HCFC-22. Kingspan was using HCFC-142b prior to the transition date. Industry data and documentation shows that the replacement BA for the industry was HFC-134a. Studies and reports were published at various conferences showing that HFC-134a was the "drop-in" solution for HCFC-142b. The Federal Register documents comments provided from

the industry also state that HFC-134a was the replacement BA for HCFC-142b. Additionally, the chemical properties of HFC-134a are very similar to HCFC-142b, which made it the ideal replacement BA.

E.
QUANTIFICATION

E1. BASELINE

Equation 1 – Baseline Emissions Equation

$$BE_{BBA} = \{(Q_{BBA} \times LL_{BBA}) / 2204.62_{lbs/tonne}\} \times GWP_{BBA}$$

Parameter	Description
BE_{BBA}	Baseline emissions (tonnes CO_2e).
Q_{BBA}	Quantity of Baseline BA (lbs) which would have been used to manufacture the foam in the absence of the project activity.
LL_{BBA}	Leakage lifetime emission rate associated with the foam application (Tables 5 & 6 of methodology).
2204.62	Pound to metric ton conversion.
GWP_{BBA}	The GWP of the Baseline BA.

Equation 2 – BAR Equation

$$Q_{BBA} = Q_{EBA} \times BAR$$

Parameter	Description
Q_{BBA}	The quantity of Baseline BA (in pounds) which would have been used to manufacture the foam in the absence of the project activity.
Q_{EBA}	The quantity of Eligible BA (lbs) which is used to manufacture the foam for the project.
BAR	The quantity of Eligible BA, as compared to the Baseline BA, that is required to replace the Baseline BA to produce a foam with equivalent thermal performance (%).

E2. PROJECT SCENARIO

Equation 3 – Project Emissions Equation

$$PE_{EBA} = \{(Q_{EBA} \times LL_{EBA}) / 2204.62_{lbs/tonne}\} \times GWP_{EBA}$$

Parameter	Description
PE_{EBA}	Project emissions (tonnes CO_2e).
Q_{EBA}	The quantity of Eligible BA (lbs), which is used to manufacture the foam for the project.
LL_{EBA}	The Leakage Lifetime emission rate of the foam application (set equal to emission factor used in Equation 1).
2204.62	Pound to metric ton conversion.
GWP_{EBA}	The GWP of the Eligible BA.

E3. LEAKAGE

Leakage is accounted for using Equation #4 from the Methodology. An 8" secondary extruder was replaced with a 10" extruder. The original 8" extruder was decommissioned. A secondary cooling system was installed and the old cooling system was decommissioned. Existing tankage was refurbished and put into service for the new blowing agents. The remainder of the Baseline foam manufacturing equipment is used in the Project Scenario. Line E-7 was added and put into service in 2017. Therefore, leakage effects are not to be considered and LE_{LBA} is equal to zero.

Equation 4 – Leakage Emissions Equation

$$LE_{LBA} = \{(Q_{LBA} \times LL_{LBA}) / 2204.62_{lbs/tonne}\} \times GWP_{LBA}$$

Parameter	*Description*
LE_{LBA}	Activity shifting leakage emissions (tonnes CO_2e).
Q_{LBA}	The quantity of BA (in pounds) that is used at the new location.
LL_{LBA}	The Leakage Lifetime emission rate associated with the foam application of the BA used at the new location (See Tables 5 and 6).
2204.62	Pounds to metric ton conversion.
GWP_{LBA}	The GWP of the BA used at the new location.

E4. UNCERTAINTY

There is no uncertainty with respect to the projected emission reductions. All calculations are based on existing production and financial information. The formulae used for the BA calculations are precise since the products involved must be manufactured based on quality control requirements for the finished products.

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

The net reductions are finally quantified using Methodology equations 1, 2, 3 4 and 5.

Equation 5 – Project Emission Reductions Calculation

$$ER = (BE_{BBA} - LE_{LBA}) – PE_{EBA}$$

Parameter	Description
ER	Equation 5 - Emission reductions (tonnes CO_2e).
BE_{BBA}	Equation 1 - Baseline emissions (tonnes CO_2e).
PE_{EBA}	Equation 3 - Project emissions (tonnes CO_2e).
LE_{LBA}	Equation 4 - Project leakage emissions (tonnes CO_2e).

E6. EX-ANTE ESTIMATION METHODS

Emission reductions are directly correlated to the BA used prior to the transition (eg, HFC-134a), the BAR, and the amount of Eligible BA used during the Reporting Period. The equations in the Methodology calculate the GHG reductions in the Leakage Lifetime of the XPS boardstock product. There is only one Reporting Period that will issue all 25 years of ERTs upon final Verification.

Table 6- Offset Volume Estimates

Project	Location	Vintage	Total ERTs[2] (metric tonnes CO2e)
Foam Blowing Agent Project 003F 100% Emission Rate	**North America**	**2020**	**1,934,327**
Foam Blowing Agent Project 003F ERTs First Issuance	**North America**	**2020**	**614,148**
Foam Blowing Agent Project 003F Outstanding ERTs to be Issued	**North America**	**2020**	**1,320,179**

[2] *Total offsets created reflects the Methodology calculation that allows for 100% of reductions to be issued as ERTs upon Verification.*

F.
COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

The potential impacts on the local community and the environment were considered. Positive community impacts include the reduction of GHG emissions from foam manufacturing both at the local level (near the manufacturing facility) 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 sustainability goals as articulated by the UN Department of Economic and Social Affairs, in #Envision2030.

Goal #9 , [Industry, Innovation and Infrastructure] is met because the use of low-GWP blowing agents for manufacturing in industrial sectors for insulation products (where there has been very little adoption of such sectors) is incentivized by the Project, such as these two, under the FBA methodology. The technology can be used in developing countries since it is a drop in technology with only small adjustments to manufacturing techniques required. Goal #12 [Responsible Consumption and Production] is met because the Project produces virtually no waste in the foam manufacturing process and involves a closed loop manufacturing process with virtually no releases to the environment. Goal #13 [Climate Action] is met because the Ecomate blowing agent [<5GWP] being used in the Project was invented to anticipate and meet climate goals and is continuing to be refined and its use expanded, including to manufacturing in developing countries.

F2. STAKEHOLDER COMMENTS

Not applicable for this project type.

G.
OWNERSHIP AND TITLE

G1. PROOF OF TITLE

Kingspan Insulation, LLC, the manufacturer of XPS boardstock, and Foam Supplies, Inc., the Project Proponent, have agreed to assign the title and rights to carbon offset credits to Foam Supplies, Inc.

G2. CHAIN OF CUSTODY

There is no chain of custody issue with respect to this Project. The material which gives rise to the offset credits is transported, mixed and used in the manufacturing processes. The documentation of such usage is in the invoicing and records addressed above in the Monitoring section.

G3. PRIOR APPLICATION

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

H.
PROJECT TIMELINE

H1. START DATE

Table 7 – Project Start Date Determinations

Project	Project Start Date	How Determined
FBA 003F	January 1, 2020	Service records for manufacturing products with methyl formate as the blowing agent.

H2. PROJECT TIMELINE

Table 8 – Project Timelines

Relevant Project Activities in GHG Project Cycle	003F
Initiation of Project Activities	January 1, 2020
Project Term	N/A
Crediting Period	1/1/20 - 12/31/44
Reporting Period	1/1/20 - 12/31/20
Frequency of Reporting	Once for 2020
Monitoring Period	1/1/20 - 12/31/20
Frequency of Monitoring	Ongoing through 2020
Frequency of Validation	Once in 2021, Once in 2022
Frequency of Verification	Once in 2021, Once in 2022