

Validation Report for Whirlpool Manufacturing Co., Inc.

American Carbon Registry

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1. Introduction

First Environment, Inc. (First Environment) provides this validation report to Whirlpool Corporation (Whirlpool) as a deliverable of the American Carbon Registry (ACR) project validation process. It covers the validation of the following Projects and reporting periods:

Project Name	ACR Project ID	Reporting Period
Whirlpool HFO Amana 656	ACR656	1/1/2019 – 12/31/2019
Whirlpool HFO Amana 657	ACR657	1/1/2020 – 12/31/2020
Whirlpool HFO Ottawa 658	ACR658	1/1/2019 – 12/31/2019
Whirlpool HFO Ottawa 659	ACR659	1/1/2020 – 12/31/2020
Whirlpool HFO Ramos 660	ACR660	1/1/2019 – 12/31/2019
Whirlpool HFO Ramos 661	ACR661	1/1/2020 – 12/31/2020
Whirlpool HFO Supsa 662	ACR662	1/1/2020 – 12/31/2020

The Project reports emission reductions for a single 10-year crediting period beginning on January 1 of the reporting year.

First Environment conducted validation activities from the date of the kickoff meeting through November 22, 2021.

2. Objectives

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

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

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

3. Validation Scope & Criteria

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

Geographic Boundaries	Whirlpool manufacturing plants located in: <ul style="list-style-type: none">• Amana, IA• Ottawa, OH• Ramos Arizpe, Coahuila, MX• Ciudad Apodaca, Nuevo Leon, MX
Greenhouse Gases Included	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO ₂ -e) resulting from blowing agent replacement; Project emissions from use of eligible BA (HCFO-1233zd(E)) ¹
Crediting Periods	1/1/2019 – 12/31/2028 1/1/2020 – 12/31/2029

¹ The trade name for the eligible BA is Solstice®.

Level of Assurance	Reasonable assurance
Definition of Materiality	Non-conformities with the Standards of Validation listed below are considered material

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

Standards of Validation	<ul style="list-style-type: none"> ACR Standard, Version 7.0, December 2020 (ACR Standard) Methodology for The Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals From the Transition to Advanced Formulation Blowing Agents in Foam Manufacturing and Use, Version 2.1 (the Methodology), including Errata and Clarification issued August 13, 2021
Validation Process	<ul style="list-style-type: none"> ACR Validation and Verification Standard, Version 1.1, May 2018 ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

4. Project Description

Whirlpool manufactures rigid PUF residential refrigerators and freezer equipment using the Solstice HFO, an eligible foam blowing agent (BA) under the Methodology. The Solstice HFO replaces the high global warming potential (GWP) BAs HFC-245fa or HCFC-141b, resulting in a net reduction in greenhouse gas (GHG) emissions during the foam blowing process and lifetime of manufactured foam materials.

The GHG Project Plan provides additional details about the Project.

5. Overview of the Validation Process

The following validation process was used:

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

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

5.1 Conflict of Interest Review

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

5.2 Audit Team

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

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

5.3 Audit Kick-off

The audit process was initiated with a kick-off meeting on September 15, 2021 with the primary Whirlpool contacts. The meeting focused on confirming the scope, schedule, and data required for validation activities.

5.4 Development of the Validation Plan

The Audit Team formally documented the validation plan as well as determined the data sampling plan. The validation plan was informed by the kick-off meeting where key elements of the validation scope were discussed including project team members, project level of assurance, materiality threshold, and standards of reporting and evaluation. It also provided an outline of the validation processes and established project deliverables. Whirlpool was afforded the opportunity to comment on the key elements of the plans for validation. A separate data-sampling plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

5.5 Site Visit

Messrs. Michael Carim and Jeff Daley conducted a site visit at Whirlpool's Amana, Iowa manufacturing facility on November 4, 2021 to assess GHG project boundaries, site operations, data collection processes, and information management systems, as well as to conduct interviews with key project personnel. Because all records relevant to the ACR project reporting process are through a centralized data management system accessible from Whirlpool's corporate facilities, separate site visits to additional manufacturing facilities within the scope of validation were not deemed necessary by the strategic review process.

5.6 Emissions Reduction Data and Calculation Assessment

This assessment used information and insights gained during the previous steps to evaluate the collected data and the reported emissions reduction quantities and identify if either contained material or immaterial misstatements.

5.7 Corrective Actions and Supplemental Information

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

5.8 Validation Reporting

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

6. Validation Results

6.1 Project Boundary

The Project boundary is defined as emissions from Foam Manufacture (SSR 3) and Foam Usage (SSR 5). Fugitive emissions of BAs occur in the baseline and project scenarios during foam blowing and throughout the lifetime of manufactured foam products. Emission reductions occur from the replacement of a high-GWP BA with a low-GWP BA in the foam blowing process.

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

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

6.2 Baseline Scenario

The baseline scenario is defined as the continued use of the baseline BA in the production of Rigid PUF residential refrigerators and freezers by Whirlpool. Table 1 below shows the baseline BA employed by each Whirlpool facility prior to the transition to the Solstice BA and whether a default BA was employed for the purposes of emission reduction calculations.

TABLE 1: Baseline BAs

Facility	Baseline BA	Default BA for Calculations?
Amana	HFC-245fa	No
Ottawa	HFC-245fa	No
Ramos	HFC-245fa	No
Supsa	HFC-245fa HCFC-141b	No

Whirlpool provided historical BA purchase invoices or bills of materials used for foam formulations from more than two years prior to the BA transition date for each facility to demonstrate that HFC-245fa and/or HCFC-141b was the foam blowing agent consumed in the baseline scenario. First Environment also reviewed the supplier contract for the project BA during the validation process, which stated that a high GWP-BA was used by Whirlpool at the four facilities prior to the transition to the low-GWP BA.

6.3 Emission reduction quantification methodologies and calculations

Baseline emissions are quantified according to Equations 1 and 2 in the Methodology based on the quantity of eligible BA consumed and the Blowing Agent Ratio, the latter of which is used to determine the equivalent quantity of baseline BA that is required to produce a foam with equivalent thermal performance.

Project emissions are quantified directly from the quantity of eligible BA consumed according to Equation 3 in the Methodology.

The Project Activity does not result 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; therefore, activity-shifting leakage emissions are not considered. Site visit interviews and other testimonial evidence from plant personnel were used to confirm that no activity-shifting leakage emissions occurred as a result of Project implementation.

Total net emission reductions are determined according to Equation 5 in the Methodology by subtracting project emissions from baseline emissions.

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

6.4 Data Monitoring and Management System

The monitoring plan described within the GHG Project Plan includes all relevant data and parameters required to obtain a reliable result of generated emission reductions and meets the requirements of the Methodology. The primary variables to be monitored in order to determine and account for emission reductions are presented in Table 2 below.

TABLE 2: Monitoring Parameters

Monitoring Parameter	Method of Estimation	Frequency of Measurement	Unit of Measurement	Frequency of Recording
Blowing Agent Ratio (BAR)	Calculated	Once at validation	Dimensionless	N/A
Quantity of eligible BA used in the project (Q _{EBA})	BA purchase records	Continuous	Pounds	As purchased

The GHG Project Plan includes a description of the frequency, responsibility, and procedures for recording, storing, monitoring, and measuring all project data. All requirements in Sections 5.1 and 5.2.1 of the Methodology are addressed by the monitoring plan contained with the GHG Project Plan. The adequacy of the data management systems described in the monitoring plan was assessed during site visits conducted for previous validation/verification activities for Whirlpool through reviewing data collection procedures and system controls with plant personnel and interviews with Whirlpool management staff.

The requirements in Section 5.2.2 and 5.2.3 of the Methodology relevant to a formulator or systems house are not applicable to the project activity.

6.5 QA/QC Procedures

The GHG Project Plan includes QA/QC procedures for data that meet the requirements of the Methodology. Specifically, data contained in purchase and billing records originates from weigh scales at the supplier used for financial transactions, which are certified by the relevant authorities for commercial use. Due to weigh scales' use in financial transactions and customer billing, First Environment concluded that QA/QC activities are adequate for the purposes of GHG emission reduction reporting.

Due to the strong QA/QC procedures surrounding production and sales records, minimal data uncertainty is foreseen.

6.6 Project-specific Conformance to ACR Eligibility Criteria, Including Additionality

The Project meets the eligibility requirements set forth in the ACR Standard as described in Table 3 below.

TABLE 3: ACR Eligibility Criteria

Eligibility Requirement	Conformance Details	Validation Conclusion
Start Date	The start dates for the Projects are: January 1, 2019 – ACR656, ACR658, ACR660 January 1, 2020 – ACR657, ACR659, ACR661, ACR662	Consistent with requirement.
Minimum Project Term	N/A – project type does not contain risk of emission reduction reversal	N/A
Crediting Periods	Ten years – January 1, 2019 through December 31, 2028 (ACR656, ACR658, ACR660) January 1, 2020 through December 31, 2029 (ACR657, ACR659, ACR661, ACR662)	Consistent with requirement.
Real	N/A – ACR has issued an exemption to its forward crediting policy for the approved methodology applied by the Project. ²	N/A
Emission or Removal Origin	The project proponent reduces non-energy direct emissions in its manufacturing processes.	Consistent with requirement. Whirlpool maintains operational control over the process generating GHG emission reductions.
Offset Title	Whirlpool provided the agreement with the BA supplier and a management attestation confirming offset title to emission reductions associated with the BA transition.	Consistent with requirement. The agreement with the supplier does not restrict Whirlpool's ability to claim offset title associated with the low-GWP blowing agent. Management attestation provided is consistent with guidance received from ACR regarding downstream claims of offset title by Whirlpool customers.
Additional	Project satisfies additionality test in approved methodology and Regulatory Test in ACR Standard.	Project conforms to ACR additionality criteria. See Section 6.7 below for conformance details.

² ACR guidance on the methodology states: "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 10-year crediting period. These avoided emissions are quantified during the project's reporting period and Emission Reduction Tonnes (ERTs) are granted for the full 10 years of avoided emissions."

Eligibility Requirement	Conformance Details	Validation Conclusion
Permanent	N/A – project type does not contain risk of emission reduction reversal.	N/A
Net of Leakage	Potential for leakage emissions is accounted for under project monitoring plan and emission reduction quantification equations.	First Environment confirmed that the project has implemented sufficient mechanisms to track any potential leakage emissions.
Independently Validated and Verified	Whirlpool contracted First Environment, Inc. to provide independent, trustworthy, and objective third-party validation services to the Project.	First Environment is an ANAB-accredited and ACR-approved validation/verification body. Audit activities were performed independently and in accordance with all ACR requirements.
Environmental & Community Assessments	No negative community or environmental impacts are identified. Net positive impact due to lower GHG emissions.	Consistent with requirement. Project occurs in foam blowing manufacturing processes at private industrial facilities. No external environmental or community impacts are created from the blowing agent transition.

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

TABLE 4: Methodology Criteria

Eligibility Requirement	Conformance Details	Validation Conclusion
Location	All Whirlpool facilities are located within North America.	Consistent with requirement.
Foam Application	Rigid PUF residential refrigerators and freezers	Consistent with requirement. The foam application falls within scope of the Methodology, specifically the rigid PUF residential refrigerators and freezers category.
Start Date	See Table 2 above	
Minimum two years of usage of a BA with GWP > 30 prior to the project activity	Purchase records and supplier agreement for baseline BA; historical bills of materials for residential refrigerators and freezers	Consistent with requirement.

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

6.7 ***Additionality***

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

The Project consists of use of an eligible BA in the rigid PUF residential refrigerators and freezers application, which is an Eligible Foam Application listed in the Methodology; therefore, the project satisfies the performance standard specified by the Methodology.

In 2020, regulations came into force in California, New Jersey, and Washington that prohibit the use of HFC-245fa in the rigid PUF residential refrigerators and freezers application. Consistent with Tables 3 and 4 in the Methodology, Whirlpool selected an alternate baseline BA of HFC-152a with an associated GWP of 124 for foam products sold into these jurisdictions. Whirlpool will use accounting data to determine the percentage of equipment sales to these states and use that fraction to apportion the total reported quantity of eligible BA applied in emission reduction calculations between these locations and geographic regions where HFC-245fa is still an allowable baseline BA.

No other existing laws mandate the use of a low-GWP blowing agent in foam manufacture. Whirlpool provided a signed management attestation to confirm the Project's voluntary implementation.

6.8 ***Approved Variance or Deviations***

The project start date for ACR658 and ACR660 is January 1, 2019; however, validation of the Projects was not completed within two years of this date. The Project Proponent received approval from ACR to complete validation activities for ACR658 and ACR660 by November 30, 2021.

The Project Proponent did not request any other deviations from ACR during the validation process.

7. **Audit Findings**

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

8. **Validation Conclusion and Statement**

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

- *Level of assurance:* Reasonable assurance.
- *Objectives of validation:* To assure project conformance with the validation criteria and that the requirements of the ACR Validation and Verification Standard, Chapters 1.B. Validation objectives also include an assessment of the likelihood that implementation of the Project will result in the emission reductions stated in the GHG Project Plan.

- *Validation/Verification criteria:* American Carbon Registry Standard, Version 7.0, December 2020; Methodology for The Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals From the Transition to Advanced Formulation Blowing Agents in Foam Manufacturing and Use, Version 2.1 (the Methodology), including Errata and Clarification issued August 13, 2021
- *Definition of materiality:* Non-conformities with validation criteria are considered material.
- *Scope, including:*
 - *Boundaries of the assertion:* Whirlpool refrigeration equipment manufacturing facilities where foam manufacture occurs and use phase of the manufactured foam product.
 - *The physical infrastructure, facilities, and activities within the assertion:* Foam blowing equipment at Whirlpool facilities where foam manufacture occurs.
 - *GHG sources, sinks, and reservoirs included within the assertion:* Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO₂-e) resulting from blowing agent replacement in foam manufacturing and remaining years of foam use; Project emissions from use of eligible BA (Solstice).
 - *Crediting Periods:* January 1, 2019 to December 31, 2028 (ACR656, ACR658, ACR660) January 1, 2020 to December 31, 2029 (ACR657, ACR659, ACR661, ACR662)

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

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

Project Name	ACR Project ID	Emission Reductions
Whirlpool HFO Amana 656	ACR656	132,744
Whirlpool HFO Amana 657	ACR657	92,980
Whirlpool HFO Ottawa 658	ACR658	24,087
Whirlpool HFO Ottawa 659	ACR659	26,319
Whirlpool HFO Ramos 660	ACR660	89,278
Whirlpool HFO Ramos 661	ACR661	92,482
Whirlpool HFO Supsa 662	ACR662	127,356

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

In summary, it is First Environment's opinion that the Whirlpool HFO Amana 656, Whirlpool HFO Amana 657, Whirlpool HFO Ottawa 658, Whirlpool HFO Ottawa 659, Whirlpool HFO Ramos 660, Whirlpool HFO Ramos 661, and Whirlpool HFO Supsa 662 projects, as described in the GHG Project Plans, meet all relevant ACR requirements and correctly apply the Methodology.

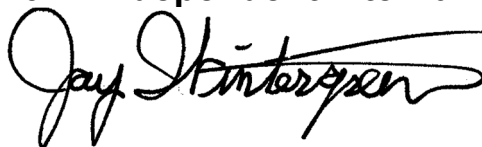
The validation of the Projects is based on the information made available to us and the engagement conditions detailed in this report. First Environment cannot guarantee the accuracy or correctness of this information. Hence, First Environment cannot be held liable by any party for decisions made or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

9. Lead Verifier Signature



Michael M. Carim
Senior Associate

10. Independent Internal Reviewer Signature



James Wintergreen
Senior Associate

11. APPENDIX A – VALIDATION FINDINGS

ID	Corrective Action Request	Summary of Participant Response	VVB Conclusion
1	The Blowing Agent Ratio (BAR) calculations performed imply that the HFO is a relatively less efficient BA because the BARs calculated are less than 1 even though the project formulations contain a lower BA percentage (by weight) than the baseline formulations. Please provide justification for the calculation methodology employed, including rationale for k-factor adjustment applied in calculations.	BAR calculations were corrected to resolve the issue. The ratio of baseline and project scenario BA fractions applied in calculations was revised to recognize that the HFO is a relative more efficient blowing agent than the HFC or HCFC used in the baseline scenario.	Response is acceptable.
2	<p>The following sections of the Project Plans contain errors or inconsistencies with ACR template requirements:</p> <ul style="list-style-type: none"> Section A3 does not reference all relevant eligibility requirements stated in the ACR Standard, Chapter 3, Table 2. Section A6 does not describe services and expected level of activity for the facilities. Section B4 does not include a table of all SSRs for the projects. Sections E1, E2, and E3 reference the correct equations from the FBA methodology but do not include the relevant sample calculations. Section G1 is incomplete and does not include proof of title documentation. For ACR660, ACR661, and ACR662, the Project Plans in Section C1 do not contain reference to relevant regulations in Mexico. 	The Project Plans were revised to resolve all errors and/or inconsistencies with the ACR template identified. The GPS coordinates for the Ramos and Supsa facilities in ACR660, ACR661, and ACR662 were updated for accuracy.	Response is acceptable.

ID	Corrective Action Request	Summary of Participant Response	VVB Conclusion
	<ul style="list-style-type: none"> For ACR660, ACR661, and ACR662, the GPS coordinates provided in section A4 appear to be incorrect. 		
3	The crediting period listed in Section H2 of the Project Plans for all Projects exceeds 10 years and is not consistently reported in a MM/DD/YYYY format.	All crediting periods identified in the Project Plans were revised to be exactly 10 years and reported in a consistent date format.	Response is acceptable.
4	Section D of the Project Plans does not include a parameter box for the parameter Q_{LBA} .	The Project Plan was updated to include Q_{LBA} as a monitored parameter and a monitoring box was added to Section D.	Response is acceptable.
5	The Monitoring Plan does not address the bullet points specified in Section 5.2.1 of the Methodology.	The Monitoring Plan was revised to address all requirements from Section 5.2.1 of the FBA Methodology.	Response is acceptable.
6	The GWP applied in calculations for HCFC-141b is inconsistent with the value published in the IPCC AR4.	The GWP applied for the baseline BA HCFC-141b was revised to 725, which is consistent with the AR4 value.	Response is acceptable.
7	The GWP applied in calculations for the eligible project BA (Solstice HFO) is inconsistent with the value identified in Table 10 of the FBA Methodology v2.1.	The GWP applied for the eligible BA HCFO-1233zd(E) was revised to 3.7, which is consistent with the value in Table 10.	Response is acceptable.

ID	Clarification Request	Summary of Participant Response	VVB Conclusion
1	Please clarify the source of data for the baseline and project foam system formulations for the Ottawa facility and provided supporting evidence, as appropriate.	Whirlpool confirmed that the system formulations for the Ottawa facility are taken from engineering bills of materials and provided evidence during a webinar to support the values applied in calculations.	Response is acceptable.