KELLY-MOORE® PAINTS

Environmental Product Declaration

AcryShield®

Premium Exterior Paint & Enamels

ASTM INTERNATIONAL
Standards Worldwide

100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA
19428-2959
United States.

EPD IMPACT SUMMARY

Company name	Kelly-Moore Paint Co., Inc.
Product type	Exterior Architectural Coating
Product name	**AcryShield Premium Exterior Paints**
Product definition	AcryShield is a line of premium exterior paints formulated with 100% acrylic resins to provide superior performance against the effects of the sun, rain and temperature changes. The family of products consists of a variety of exterior primers and finish coats in four desirable sheens – Flat, Low Sheen, Satin and Semi-Gloss. AcryShield is an excellent choice for any residential or commercial project where long term durability is needed.
Product Category Rule (PCR)	PCR for Architectural Coatings: NAICS 325510
Certification Period	January 10, 2017 – January 10, 2022
Functional Unit	1m^2 of covered and protected substrate for a period of 60 years (the assumed average lifetime of a building).
ASTM Declaration Number	057

In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.

EPD Information	
Program Operator	ASTM International
Declaration Holder	Kelly-Moore Paint Co., Inc. 1011 Commercial Street, San Carlos, CA 94070 +1 650-610-4253 TAlvarez@kellymoore.com www.kellymoore.com
Product	AcryShield Premium Exterior Paints
Date of Issue	January 10, 2017
Period of Validity	5 years
Declaration Number	057
Declaration Type	Cradle to grave EPD
Applicable Countries	North America
This EPD was independently verified by ASTM in accordance with ISO 14025: Internal External X	Signature of ASTM Representative

	Name and contact information for representative Timothy S Brooke ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428 tbrooke@astm.org
This life cycle assessment was critically reviewed in accordance with ISO 14044 and the reference PCR	Signature of LCA Representative  Name and contact information for representative Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728 t.gloria@industrial-ecology.com

LCA Information	
Basis LCA	Cradle to Grave of Latex Paints
LCA Preparer	thinkstep, Inc. 170 Milk Street, Boston, MA, Floor 3, 02109 +1 617-247-4477 info@thinkstep.com www.thinkstep.com
This life cycle assessment was critically reviewed in accordance with ISO 14044	Signature of LCA Representative  Name and contact information for representative Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728 t.gloria@industrial-ecology.com

PCR Information	
Program operator	NSF International National Center for Sustainability Standards
Reference PCR	PCR for Architectural Coatings: NAICS 325510
Validity Date	June 18, 2020
PCR review was conducted by:	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728 t.gloria@industrial-ecology.com Mr. Bill Stough Sustainable Research Group PO Box 1684 Grand. Rapids, MI 49501-1684 bstough@sustainableresearchgroup.com Dr. Michael Overcash Environmental Clarity 2908 Chipmunk Lane. Raleigh, NC 27607-3117

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AcryShield Exterior Paints EPD - Kelly-Moore

This document is a Type III environmental product declaration by Kelly-Moore that is certified by ASTM International (ASTM) as conforming to the requirements of ISO 14025. ASTM has assessed that the Life Cycle Assessment (LCA) information fulfills the requirements of ISO 14040 in accordance with the instructions listed in the product category rules cited above. The intent of this document is to further the development of environmentally compatible and sustainable construction methods by providing comprehensive environmental information related to potential impacts in accordance with international standards.

PRODUCT DEFINITION

AcryShield is a line of premium exterior paints formulated with 100% acrylic resins to provide superior performance against the effects of the sun, rain and temperature changes.
The family of products consists of a variety of exterior primers and finish coats in four desirable sheens – Flat, Low Sheen, Satin and Semi-Gloss. AcryShield is an excellent choice for any residential or commercial project where long term durability is needed.

Declared Product Description

The AcryShield Exterior Paints follows the description "A decorative or protective paint or coating that is formulated for interior or exterior architectural substances including, but not limited to: drywall, stucco, wood, metal, concrete, and masonry." It includes the following sheens: 1240 Flat Paint, 1245 Low Sheen Enamel, 1247 Satin Enamel, 1250 Semi-Gloss Enamel available in quart, gallon and five gallon size containers. There are 4 tint bases offered for all sheens in the series, as follows: Light, Medium, Deep and Neutral Bases that allow custom tinting to any desired color. AcryShield paints are also available in returnable ready-mixed colors. The chart below outlines additional technical data.

Table 1. List of AcryShield Premium Exterior Paints formulas Assessed by LCA Model and Report

	1240	1245	1247	1250
Sheen	Flat	Low Sheen	Satin	Semi-Gloss
%@60°	<5	6-10	20-35	45-55
MPI Level	Level 1	Level 2	Level 4	Level 5
MPI Category	#10, #16	#214	#15	#11
MPI GPS	MPI GPS-2	MPI GPS-2	MPI GPS-2	MPI GPS-2
VOC	<50 g/L	<50 g/L	<50 g/L	<50 g/L
Solids Weight	58%	53%	53%	46%
Solids Volume	40%	39%	41%	36%

Table 2. List of AcryShield Premium Exterior Paints Base Types Assessed by LCA Model and Report

AcryShield 100% Acrylic Exterior Paint Product Series

		Base			
Product	Sheen	Light & White	Medium	Deep	Neutral
1240	Flat	121	222	333	555
1245	Low Sheen	121	222	333	555
1247	Satin	121	222	333	555
1250	Semi-Gloss	121	222	333	555

PERFORMANCE ATTRIBUTES

Ease of application, great flow and leveling, fantastic touch-up and excellent durability are features that put AcryShield ahead of the competition. AcryShield paints are available in returnable ready-mixed colors and four bases that may be tinted to any custom color.

Performance Selection

- Excellent durability
- Excellent adhesion
- Fade & chalk resistance
- Low odor & VOC
- Mildew resistant
- Cold weather application down to 40^0 F
- Meets requirements for manufactured siding

PRODUCT COMPONENTS RELATED TO LIFE CYCLE ASSESSMENT

The material composition of the paints are in the following range:

Table 3: Material Composition Range for AcryShield Premium Exterior Paints Product Line and of Representative Product

	Minimum[%]	Maximum[%]
Water	32	58
Acrylic resin	14	35
Titanium dioxide	0	25
Nepheline syenite	1.9	26
Diatomaceous earth	0	6.5
Talc	0	1.4
Preservative	0.90	1.4
Rheology modifier	1.9	5.3
Coalescent	1.0	1.8
Surfactant	1.2	2.7

The functional unit for the study was covering and protecting $1m^2$ of substrate for a period of 60 years (the assumed lifetime of a building). The functional unit and the reference flow required for the functional unit was calculated for both the market life as prescribed by the PCR. Market life for exterior paints is 10 years and design life is either based on quality determined by ASTM testing and shown in Table 4 or on the paint warranty. This EPD assumes 10 years based on the exterior paint warranty. Results were calculated for all base and sheen formulations.

Table 4: Design Life by Coating Type and Quality Designation

Coating Type	Low Quality	Mid Quality	High Quality	Alternative
Interior Paint	3 years	7 years	15 years	N/A
Exterior Paint	5 years	10 years	20 years	Warranty

Table 5: Design Life- Reference flow, quantity of colorant, and lifetime

	Lifetime (years)	Quantity needed during lifetime (kg/FU)	Tint needed during lifetime (g/FU)
1240-121	10	0.579	25.2
1240-222	10	0.535	48.2
1240-333	10	0.497	59.2
1240-555	10	0.447	88.5
1245-121	10	0.552	25.3
1245-222	10	0.500	46.8
1245-333	10	0.459	58.1
1245-555	10	0.430	57.0
1247-121	10	0.521	25.3
1247-222	10	0.470	46.9
1247-333	10	0.428	58.1
1247-555	10	0.372	84.7
1250-121	10	0.492	25.1
1250-222	10	0.469	48.7
1250-333	10	0.401	56.5
1250-555	10	0.370	87.6

Table 6: Market Life- Reference flow, quantity of colorant, and lifetime

	Lifetime (years)	Quantity needed during lifetime (kg/FU)	Tint needed during lifetime (g/FU)
1240-121	10	0.579	25.2
1240-222	10	0.535	48.2
1240-333	10	0.497	59.2
1240-555	10	0.447	88.5
1245-121	10	0.552	25.3
1245-222	10	0.500	46.8
1245-333	10	0.459	58.1
1245-555	10	0.430	57.0
1247-121	10	0.521	25.3
1247-222	10	0.470	46.9
1247-333	10	0.428	58.1
1247-555	10	0.372	84.7
1250-121	10	0.492	25.1
1250-222	10	0.469	48.7
1250-333	10	0.401	56.5
1250-555	10	0.370	87.6

SCOPE AND BOUNDARIES OF THE LIFE CYCLE ASSESMENT

System Boundaries

The LCA was performed according to ISO 14040 standards. The system is a cradle to grave LCA and includes the following modules as defined in the PCR. The declaration covers the full range of AcryShield Premium Exterior Paints sold in the North American market for the reference year 2015.

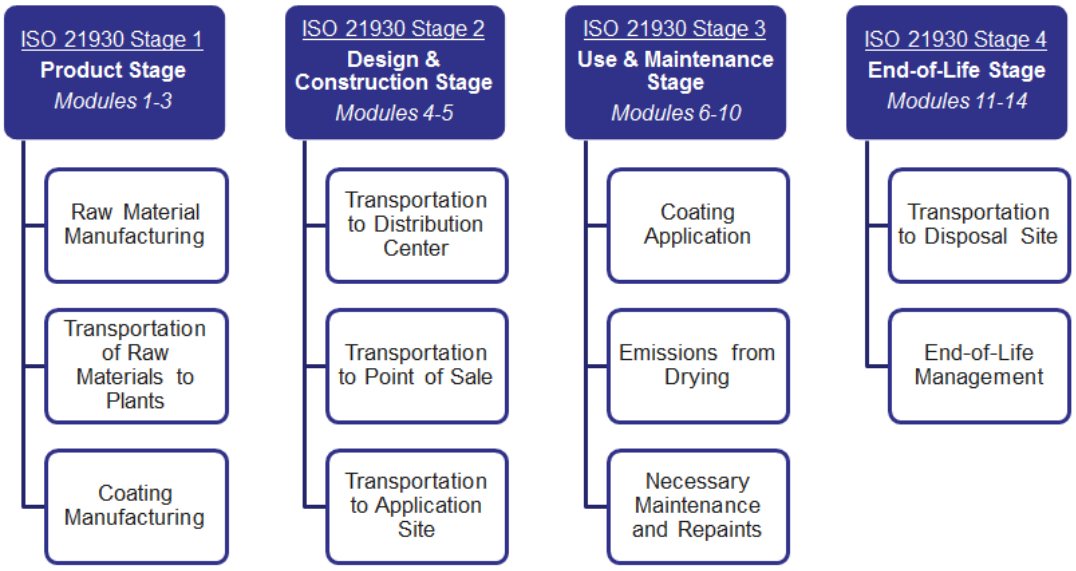

Figure 1: System Boundaries for Cradle to Grave LCA

Assumptions

The described modeling approach makes assumptions in order to represent cradle-to-grave environmental performance of Kelly-Moore latex paint products. These assumptions include those that are prescribed by the PCR, such as in packaging disposal and recovery treatment, as well as transport distances along the life cycle.

Cut-off Criteria

No cut-off criteria are defined by this study. For processes within the system boundary, all available energy and material flow data have been included in the model.

Data Quality

Primary data was obtained from Kelly-Moore's two facilities at Hurst, TX and San Carlos, CA facilities for the 2015 reference year. Background data was obtained from the GaBi 2016 database and are representative of the years 2010 - 2015. Overall, both primary and background data are representative of the product system and have been deemed high quality.

Allocation

Manufacturing inputs for the Hurst, TX and San Carlos, CA were allocated to each paint product by mass.

PRODUCT STAGE

Latex paints are produced at Kelly Moore's Hurst, TX and San Carlos, CA production facilities according to the following processing steps.

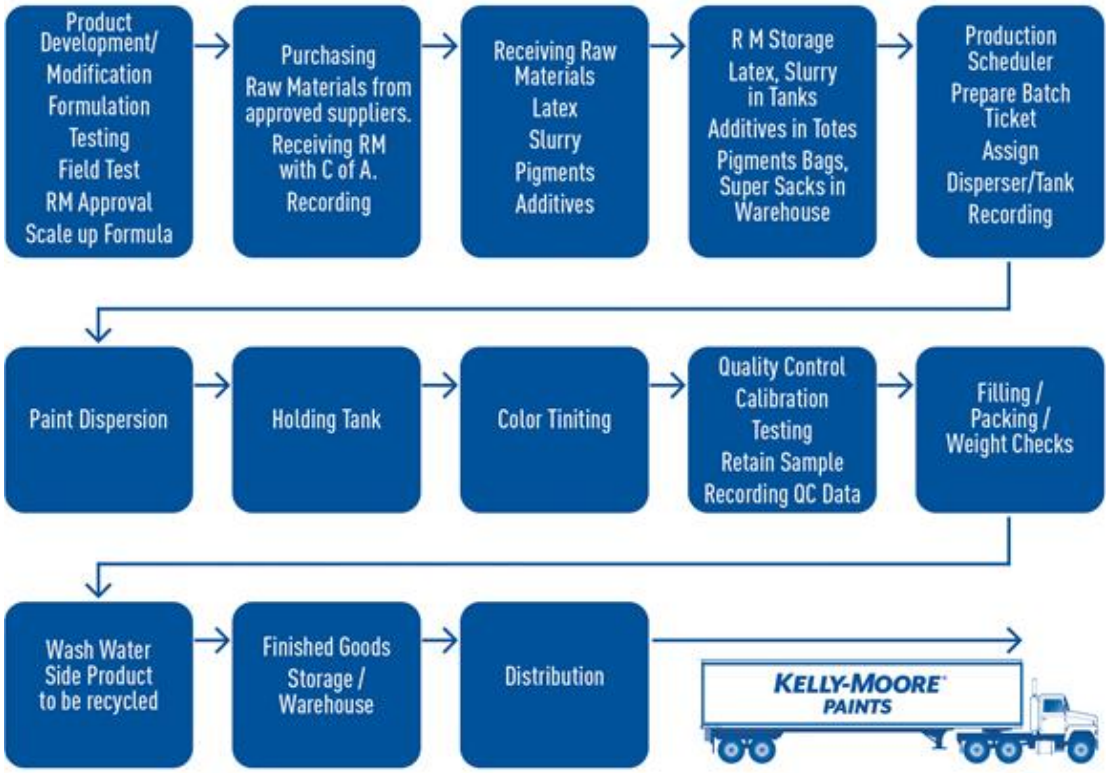

Figure 2: Kelly-Moore Process Flow Schematic

DESIGN AND CONSTRUCTION STAGE

The design and construction stage begins with the packaged paint product leaving the production site and ends with the coating being delivered to the point of application. Within this stage, the paint product is modeled as distributed to a warehouse and from there to point of sale. At point of sale, it is purchased and transported to the point of application. This stage also includes the addition of carbon black colorant at the point of sale, per the PCR.

USE AND MAINTENANCE STAGE

Application and Use

The use stage begins when the user applies the product to a substrate. This stage does not require any energy or additional cleaning inputs, but includes the VOCs emitted over the course of the paint's lifetime. All VOCs in the product were assumed to be emitted during application and use as a worst case estimation. Environmental burdens associated with repaints are attributed to the original stage in which they occurred (e.g. production of the coating for the repaint is attributed to Stage 1 - Product Stage).

Health, Safety and Environmental Aspects During Installation

Customers obtain material from a store or have the store deliver it. The customer or their contractor applies the coating to substrate(s) at customer site(s). The coating remains on the substrate material until the substrate is disposed of. This may include up to a 60 year life time, with additional /subsequent protective coatings. If the coating is handled and applied using the recommendations in the safety data sheet and technical data sheet, minimal health and environmental impacts should occur, and maximum product and substrate life should be expected.

Waste

Disposal of any leftover coating and discarded packaging is categorized under the end-of-life stage. A 10% loss rate during application was included per the PCR.

Packaging

Quart and gallon cans are manufactured from metal and contain 65-70% recycled material. Kelly Moore's 5-gallon bucket requires 10% less resin by mass to produce than typical 5-gallon buckets on the market. This packaging is marked on the bottom for recycling.

END OF LIFE STAGE

Recycling or Reuse

Stores encourage customers to use PaintCare or local recycling programs, and 90 stores in California are PaintCare drop-off sites.

Unused Materials

The manufacturing facilities recycle off-spec products, materials and by-products for sale and use outside of Kelly-Moore's standard markets. The San Carlos factory and California stores send off-spec products to be recycled into e-Coat branded paint, which contains 50% pre-consumer and 50% post-consumer recycled paint.

Disposal

Product end-of-life occurs with the disposal of the substrate material. 100% of the waste is disposed of in a landfill at end of life, and cannot be separated from the substrate before disposal. Packaging is recovered at a rate of 1.4% for plastics and 70% for metals. Recovery rates represent an average fraction of generated packaging waste that is recovered in the US

LIFE CYCLE IMPACT ASSESSMENT

Key Environmental Parameters

Table 7: LCIA Results for Design Lifetime

	GWP - excl biogenic carbon [kg CO2-Equiv.]	GWP - incl biogenic carbon [kg CO2-Equiv.]	Acidification [kg SO2-Equiv.]	Eutrophication [kg N-Equiv.]	Ozone Depletion Air [kg CFC 11-Equiv.]	Smog formation [kg O3-Equiv.]
1240-121	1.43E00	1.45E00	2.70E-02	3.07E-04	9.25E-10	9.27E-02
1240-222	1.31E00	1.33E00	1.99E-02	2.69E-04	8.75E-10	8.47E-02
1240-333	9.62E-01	9.74E-01	4.80E-03	1.75E-04	8.12E-10	6.34E-02
1240-555	8.89E-01	8.99E-01	2.58E-03	1.52E-04	7.53E-10	5.93E-02
1245-121	1.43E00	1.45E00	2.51E-02	2.99E-04	9.00E-10	8.96E-02
1245-222	1.29E00	1.31E00	1.94E-02	2.60E-04	8.46E-10	8.08E-02
1245-333	9.59E-01	9.65E-01	4.84E-03	1.71E-04	7.83E-10	6.00E-02
1245-555	9.10E-01	9.18E-01	2.59E-03	1.58E-04	7.77E-10	5.73E-02
1247-121	1.32E00	1.34E00	1.53E-02	2.59E-04	9.05E-10	8.00E-02
1247-222	1.25E00	1.26E00	1.23E-02	2.34E-04	8.18E-10	7.41E-02
1247-333	9.92E-01	1.00E00	4.91E-03	1.76E-04	8.00E-10	6.04E-02
1247-555	9.69E-01	9.77E-01	2.76E-03	1.61E-04	7.29E-10	5.71E-02
1250-121	1.58E00	1.60E00	2.35E-02	3.25E-04	9.21E-10	9.65E-02
1250-222	1.58E00	1.60E00	2.07E-02	3.15E-04	8.94E-10	9.44E-02
1250-333	1.18E00	1.19E00	5.40E-03	2.12E-04	7.89E-10	7.11E-02
1250-555	1.22E00	1.23E00	3.51E-03	2.06E-04	7.65E-10	7.13E-02

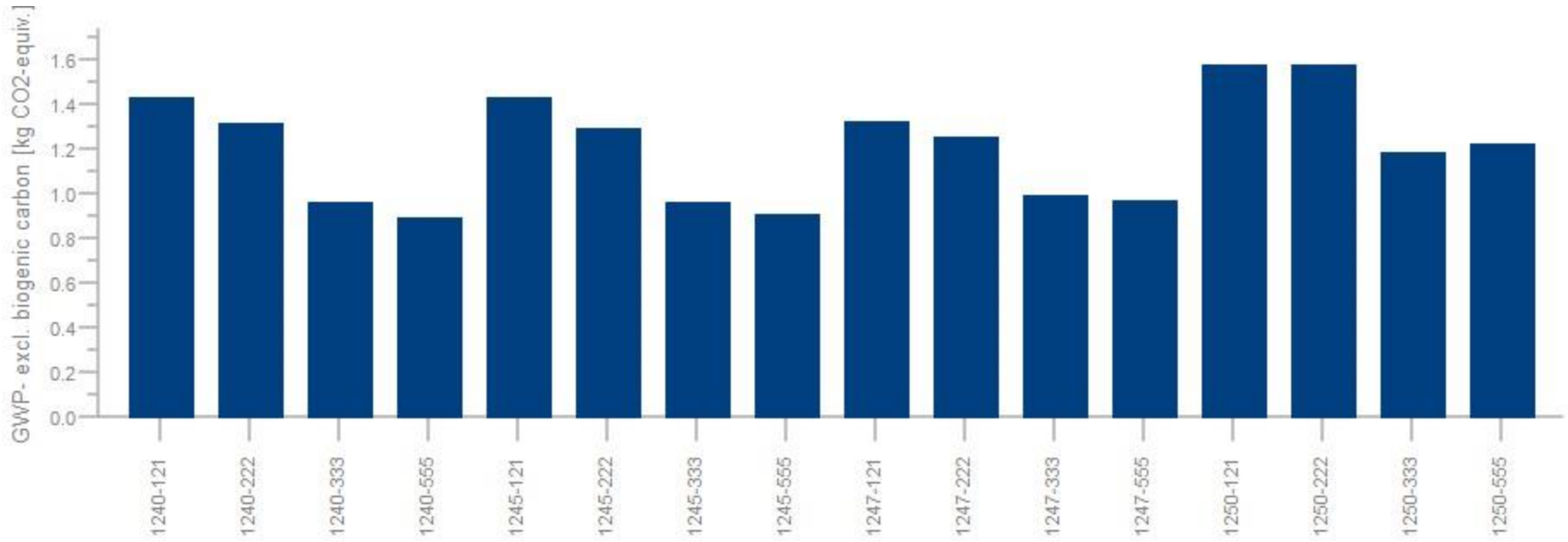

Figure 3: Global Warming Potential, Excluding Biogenic Carbon for Design Lifetime

Table 8: LCIA for Design Lifetime by PCR stages (Representative Product, 1240-121)

	Stage 1	Stage 2	Stage 3	Stage 4
GWP - excl biogenic carbon [kg CO2-Equiv.]	1.25E00	1.62E-01		9.80E-03
GWP - incl biogenic carbon [kg CO2-Equiv.]	1.28E00	1.59E-01		9.51E-03
Acidification [kg SO2-Equiv.]	2.65E-02	4.20E-04		9.61E-05
Eutrophication [kg N-Equiv.]	2.65E-04	3.56E-05		7.28E-06

Ozone Depletion Air [kg CFC 11-Equiv.]	6.21E-10	5.47E-12		2.99E-10
Smog formation [kg O3-Equiv.]	6.07E-02	7.38E-03	2.27E-02	2.00E-03

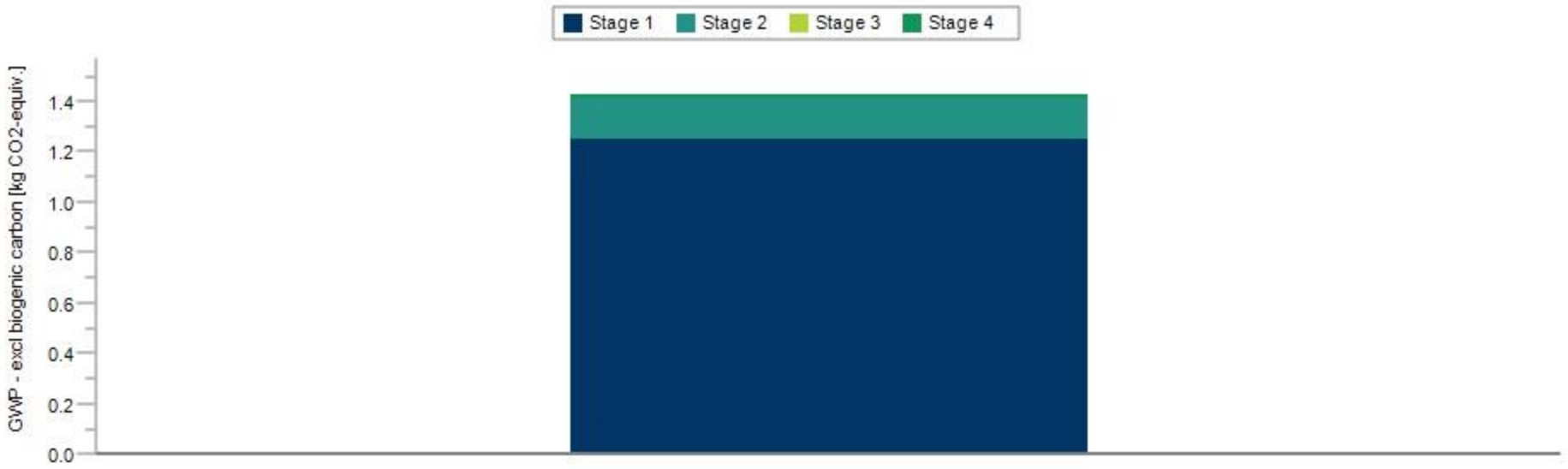

Figure 4: Global Warming Potential, Excluding Biogenic Carbon for Design Lifetime, (Representative Product, 1240-121)

Table 9: LCIA Results for Market Lifetime

	GWP - excl biogenic carbon [kg CO2-Equiv.]	GWP - incl biogenic carbon [kg CO2-Equiv.]	Acidification [kg SO2-Equiv.]	Eutrophication [kg N-Equiv.]	Ozone Depletion Air [kg CFC 11-Equiv.]	Smog formation [kg O3-Equiv.]
1240-121	1.43E00	1.45E00	2.70E-02	3.07E-04	9.25E-10	9.27E-02
1240-222	1.31E00	1.33E00	1.99E-02	2.69E-04	8.75E-10	8.47E-02
1240-333	9.62E-01	9.74E-01	4.80E-03	1.75E-04	8.12E-10	6.34E-02
1240-555	8.89E-01	8.99E-01	2.58E-03	1.52E-04	7.53E-10	5.93E-02
1245-121	1.43E00	1.45E00	2.51E-02	2.99E-04	9.00E-10	8.96E-02
1245-222	1.29E00	1.31E00	1.94E-02	2.60E-04	8.46E-10	8.08E-02
1245-333	9.59E-01	9.65E-01	4.84E-03	1.71E-04	7.83E-10	6.00E-02
1245-555	9.10E-01	9.18E-01	2.59E-03	1.58E-04	7.77E-10	5.73E-02
1247-121	1.32E00	1.34E00	1.53E-02	2.59E-04	9.05E-10	8.00E-02
1247-222	1.25E00	1.26E00	1.23E-02	2.34E-04	8.18E-10	7.41E-02
1247-333	9.92E-01	1.00E00	4.91E-03	1.76E-04	8.00E-10	6.04E-02
1247-555	9.69E-01	9.77E-01	2.76E-03	1.61E-04	7.29E-10	5.71E-02
1250-121	1.58E00	1.60E00	2.35E-02	3.25E-04	9.21E-10	9.65E-02
1250-222	1.58E00	1.60E00	2.07E-02	3.15E-04	8.94E-10	9.44E-02
1250-333	1.18E00	1.19E00	5.40E-03	2.12E-04	7.89E-10	7.11E-02
1250-555	1.22E00	1.23E00	3.51E-03	2.06E-04	7.65E-10	7.13E-02

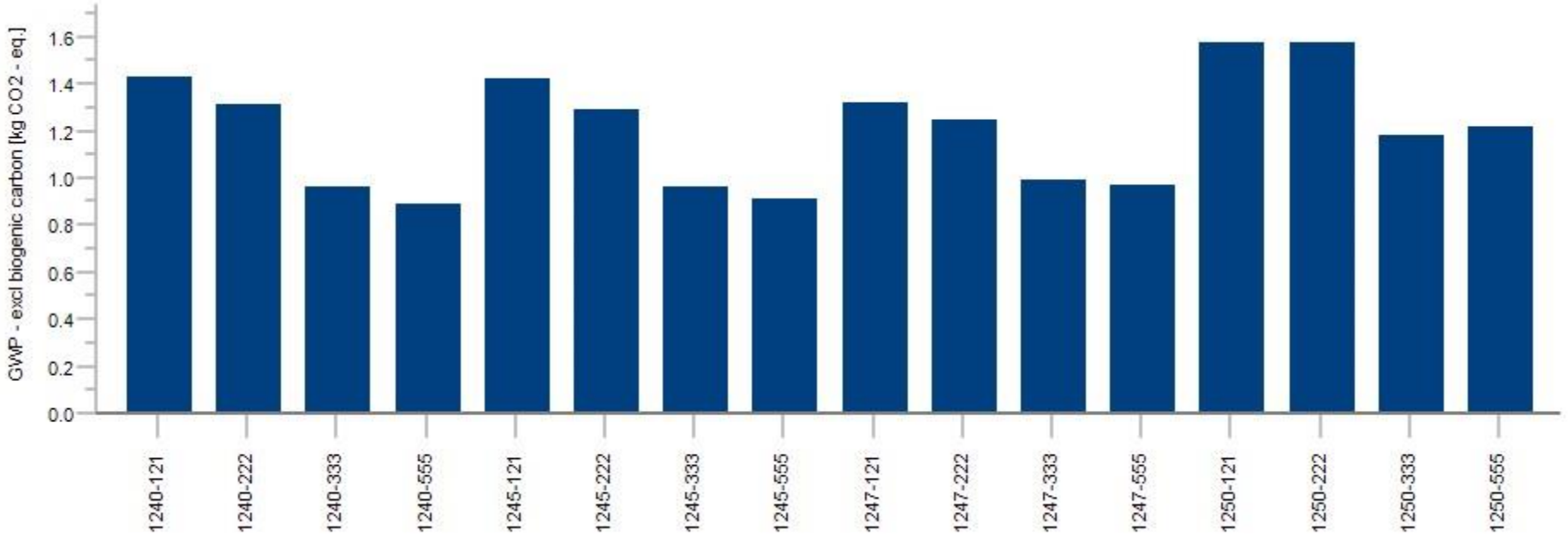

Figure 5: Global Warming Potential, Excluding Biogenic Carbon for Market Lifetime

Table 10: Life Cycle Inventory Data for Market Lifetime (Representative Product, 1240-121)

	Stage 1	Stage 2	Stage 3	Stage 4
GWP - excl biogenic carbon [kg CO2-Equiv.]	1.25E00	1.62E-01		9.80E-03
GWP - incl biogenic carbon [kg CO2-Equiv.]	1.28E00	1.59E-01		9.51E-03
Acidification [kg SO2-Equiv.]	2.65E-02	4.20E-04		9.61E-05
Eutrophication [kg N-Equiv.]	2.65E-04	3.56E-05		7.28E-06
Ozone Depletion Air [kg CFC 11-Equiv.]	6.21E-10	5.47E-12		2.99E-10

Smog formation [kg O3-Equiv.]	6.07E-02	7.38E-03	2.27E-02	2.00E-03

Material and Energy Resources, Emissions, and Wastes

The additional inventory results required by the PCR for each product are shown in the tables below.

Table 11: Energy Resources for Design Lifetime, (Representative Product, 1240-121) [MJ, net heating value]

	[MJ]
Hydro/wind power	6.58E-01
Fossil energy	2.43E01
Nuclear energy	1.40E00
Other energy	9.23E-01

Table 12: Other Environmental Information for Design Lifetime, (Representative Product, 1240-121)

	Stage 1	Stage 2	Stage 3	Stage 4
Consumption of fresh water [m^3]	6.73E-03	7.73E-04		-9.02E-07
Hazardous waste (deposited) [kg]	5.38E-08	5.27E-07		6.37E-10
Non-hazardous waste (deposited) [kg]	2.93E-02	2.88E-04		6.17E-01
Recycled materials [kg]				5.66E-03
Secondary raw material [kg]	2.60E-04			
Use of non-renewable energy resources [MJ]	1.49E00			
Use of renewable material resources [kg]	3.01E-05			

Table 13: Energy Resources for Market Lifetime, (Representative Product, 1240-121) [MJ, net heating value]

	[MJ]
Hydro/wind power	6.58E-01
Fossil energy	2.43E01
Nuclear energy	1.40E00
Other energy	9.23E-01

Table 14: Other Environmental Information for Market Lifetime, (Representative Product, 1240-121)

	Stage 1	Stage 2	Stage 3	Stage 4
Consumption of fresh water [m^3]	6.73E-03	7.73E-04		-9.02E-07
Hazardous waste (deposited) [kg]	5.38E-08	5.27E-07		6.37E-10
Non-hazardous waste (deposited) [kg]	2.93E-02	2.88E-04		6.17E-01
Recycled materials [kg]				5.66E-03
Secondary raw material [kg]	2.60E-04			
Use of non-renewable energy resources [MJ]	1.49E00			
Use of renewable material resources [kg]	3.01E-05			

LCIA Interpretation
For the AcryShield Premium Exterior Paints products, raw materials and manufacturing are the highest contributors to all impact categories. The impact from the design and construction phase is small but not insignificant and can be mostly attributed to transportation. There is a significant portion of smog formation potential from emissions of VOCs during the use phase. Since the amount of repaints and the quality and lifetime of the paints has such a direct impact on the results, any work towards improving the warranty of the product would significantly reduce the impacts.

ADDITIONAL ENVIRONMENTAL INFORMATION

Certifications
MPI Approved Products
Meets LEED 4.2 VOC Limits
Meets CARB VOC Limits
Meets National AIM VOC Limits

REFERENCES

IPCC. (2013). *Climate Change 2013: The Physical Science Basis.* Genf, Schweiz: IPCC.

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