PPG Architectural Coatings
400 Bertha Lamme Drive
Cranberry Township, PA, 16066

Environmental Product Declaration – Pitt-Tech® Plus EP DTM

Certified Environmental Product Declaration
www.nsf.org

Pitt-Tech® Plus EP DTM are a collection of waterborne acrylic coatings for industrial applications providing good hiding, rust and scrub resistant properties. *Pitt-Tech Plus EP DTM* is available in 2,000+ colors along with professional color tools from PPG THE VOICE OF COLOR® program to meet any project need. Visit ppgpaints.com for more information.

The product image to the right is an example of one of the formulas covered by the EPD. A list of all relevant formulas is shown in Table 1 in this EPD.

Declaration Holder	PPG Architectural Finishes, Inc. (email: PPGACProductStewardship@ppg.com); website: www.ppgac.com for additional information)
Declaration Number	EPD10735
Declared Product	Pitt-Tech Plus
Product Category and Subcategory	Architectural Coatings – Interior Coatings
Program Operator	NSF International (ncss@nsf.org)
PCR	PCR for Architectural Coatings – 6-23-2017
Date of Issue	June 17, 2022
Period of Validity	5 years from date of issue
Product Contents	See Table 1.

The PCR review was conducted by	Thomas P. Gloria, PhD – Industrial Ecology Consultants (t.gloria@industrial-ecology.com)	
This EPD was independently verified by NSF Certification, LLC in accordance with ISO 14025 and the PCR by	Tony Favilla afavilla@nsf.org	☐ Internal ☒ External
This life cycle assessment was independently verified in accordance with ISO 14044 and the PCR by	Jack Geibig – EcoForm jgeibig@ecoform.com	☐ Internal ☒ External

Functional Unit	1m^2 of covered and protected substrate for a period of 60 years (the assumed average lifetime of a building)
Market-Based Lifetime Used in Assessment	5 years
Design Lifetime Used in Assessment	Varies (See Table 4)
Test Methods Used to Calculate Design Life	ASTM D2805-11, ASTM D2486-06, ASTM D6736-08, ASTM D4828-94
Estimated Amount of Colorant	Varies (see Table 4)
Data Quality Assessment Score	Very Good
Manufacturing Location(s)	All PPG manufacturing locations in the United States producing the products listed in this EPD.
LCA Software and Version Number Used	SimaPro v 9.3.0.3.

Contents of the Declaration:

Product Definition, Characteristics and Specifications | LCA Methodology | Key Environmental Parameters
Material and Energy Resource Use, Emissions and Waste | LCA Interpretation | Additional Environmental Information | Data Quality Assessment | References | Glossary

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.

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Product Definition, Characteristics and Specifications:

The Pitt-Tech® Plus EP DTM professional line is available in a gloss, semi-gloss, and satin sheens. *Pitt-Tech® Plus EP DTM* are a collection of coatings for industrial application providing good hiding, rust and scrub resistant properties. *Pitt-Tech Plus EP DTM* is manufactured by PPG at several manufacturing facilities throughout the United States, and with global headquarters in Pittsburgh, Pennsylvania.

Product Classification and Description:

The *Pitt-Tech Plus EP DTM* products listed below are included within this assessment. The primary differences between these products are gloss levels (sheen) and base types. For additional information on each of the specific products, please visit www.ppgpaints.com.

Table 1 - List of *Pitt-Tech Plus EP DTM* plus formulas assessed by LCA model and report

EPD PRODUCT NAME	PRODUCT NUMBER
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS W/P BASE	90-1510
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS MIDTONE BASE	90-1520
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS NEUTRAL BASE	90-1540
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS BLACK	90-1553
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS RED BASE	90-1580
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS YELLOW BASE	90-1560
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS W/P BASE	90-1610
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS MIDTONE BASE	90-1620
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS NEUTRAL BASE	90-1640
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS BLACK	90-1653
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS RED BASE	90-1660
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS YELLOW BASE	90-1680
PITT-TECH® PLUS EP DTM ACRYLIC SATIN W/P BASE	90-1710
PITT-TECH® PLUS EP DTM ACRYLIC SATIN MIDTONE BASE	90-1720
PITT-TECH® PLUS EP DTM ACRYLIC SATIN NEUTRAL BASE	90-1740
PITT-TECH® PLUS EP DTM ACRYLIC SATIN BLACK	90-1753

Under the Product Category Rule (PCR) for Architectural Coatings, all of the *Pitt-Tech Plus EP DTM* plus products fall under the General exterior and interior coatings category. All *Pitt-Tech Plus EP DTM* plus products described in this EPD are considered to be Interior/ Exterior Industrial Coatings (See Glossary for category definitions).

The manufacturing process for architectural coatings primarily involves the mixing and dispersing of raw materials into a homogeneous mixture. Raw materials include *pigments and fillers*, which provide color, hiding, and gloss control; *resins/binders*, which dry to form a solid film and adhere the coating to the substrate; *water*, which acts as a thinner and carrier; and *additives*, which assist with various coating properties. The product is then packaged for distribution to the customer.

The typical composition of a *Pitt-Tech Plus EP DTM* plus coating is shown by % weight in Table 2 along with simplified version of this process shown in Figure 1.

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About PPG PAINTS™

PPG Paints is focused on painting professionals. We understand the specific needs of the commercial, maintenance, multi-family, new home and residential segments and deliver solutions for every job. We provide comprehensive and personal support with knowledgeable and service focused paint experts. The *PPG Paints* brand is available at more than 2,400 company-owned stores and independent dealer locations nationwide. Visit ppgpaints.com for more information.

Ingredient category	% of product by weight
Additives	2-7%
Preservatives	0-1%
Binders	6-22%
Fillers	1-27%
Glycols, esters & ethers	0-1%
Pigments	0-1%
Titanium dioxide	0-16%
Water	45-75%

Table 2 - Composition of products listed in this EPD

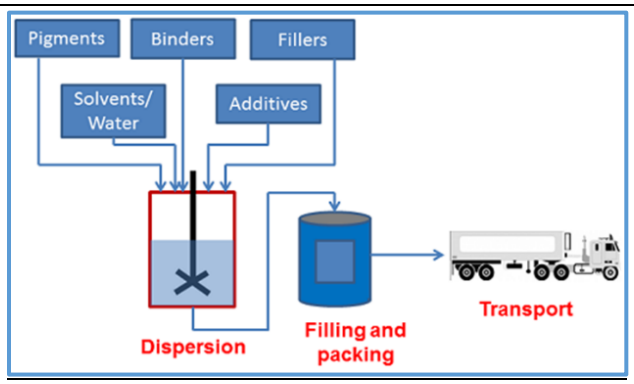

Figure 1 - Simplified process diagram for architectural coatings manufacturing

Life Cycle Assessment Methodology:

Calculation of quantities needed to satisfy the functional unit:

In accordance with the PCR, this EPD is based on a cradle-to-grave LCA, and the functional unit for the study is defined as 1 m^2 of covered and protected substrate for a period of 60 years (the assumed average lifetime of a building). The PCR requires separate analyses for a market-based lifetime and a design lifetime for the coating product. The prescribed market-based lifetime for interior coatings is 5 years. Durability testing is specified to determine the design lifetime, separated into low quality (3 year lifetime), medium quality (7 year lifetime) and high quality (15 year lifetime) finishes. The specific tests and results required to qualify for each design lifetime classification are shown in Table 3.

Table 3 - Required testing for design lifetime of interior coatings

Test Type	Test	Substrate	Low Quality	Mid Quality	High Quality
Scrub Resistance	ASTM D2486-06 (2012)e1	Plastic	< 100 scrubs	100 – 400 scrubs	> 400 scrubs
Burnish – 20 cycle	ASTM D6736-08 (2013)	Plastic	Change in gloss > 20	Change in gloss between 10 – 20	Change in gloss < 10
Washability	ASTM D4828-94 (2012)e1	Plastic	Avg. score < 3	Avg. score between 3 – 7	Avg. score > 7

Each *Pitt-Tech Plus EP DTM* plus product was subjected to these tests and the corresponding quality levels and coating quantities were calculated for each (Table 4).

Following the PCR, for any coating that can accept colorant, it was assumed that the full allowable amount of colorant is added to the paint either at the point of sale or application site. The tint/colorant inventory was taken from the GaBi carbon black pigment data (furnace black; deep black pigment – Revised 11/30/2014) in the appropriate quantity specified for the type of coating base for the respective *Pitt-Tech Plus EP DTM* product. The amount of colorant needed for each formula is shown in Table 4, and its impact is included in the overall LCA results.

Table 4 - Coating lifetimes and quantities needed to satisfy functional unit

EPD Product Name	Quality level	Technical lifetime (years)	Market lifetime (years)	Technical lifetime quantity (kg)	Market lifetime quantity (kg)	Colorant - Technical lifetime (g)	Colorant - Market lifetime (g)
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS W/P BASE	Mid	7	5	1.25	1.88	49	73
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS MIDTONE BASE	High	15	5	0.58	1.74	73	218
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS NEUTRAL BASE	Mid	7	5	1.07	1.61	171	256
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS BLACK	High	15	5	0.68	1.77	0	0
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS RED BASE	High	15	5	0.68	1.77	107	277
PITT-TECH® PLUS EP DTM ACRYLIC GLOSS YELLOW BASE	Mid	7	5	1.26	1.81	192	277
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS W/P BASE	High	15	5	0.64	1.91	24	73
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS MIDTONE BASE	High	15	5	0.60	1.80	73	218
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS NEUTRAL BASE	High	15	5	0.55	1.65	85	256
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS BLACK	High	15	5	0.55	1.64	0	0
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS RED BASE	Mid	7	5	1.23	1.78	192	277
PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS YELLOW BASE	Mid	7	5	1.26	1.82	192	277
PITT-TECH® PLUS EP DTM ACRYLIC SATIN W/P BASE	High	15	5	0.66	1.98	24	73
PITT-TECH® PLUS EP DTM ACRYLIC SATIN MIDTONE BASE	Mid	7	5	1.23	1.85	146	218
PITT-TECH® PLUS EP DTM ACRYLIC SATIN NEUTRAL BASE	Mid	7	5	1.16	1.74	171	256
PITT-TECH® PLUS EP DTM ACRYLIC SATIN BLACK	Mid	7	5	1.15	1.72	0	0

Allocation:

No co-product allocations were used in the LCA model except those included by default in the Ecoinvent background database.

System Boundary:

Because this is a cradle-to-grave LCA as required by the PCR, the system boundary includes all life cycle stages as defined by ISO 21930, from raw material extraction and processing, coating manufacture, application and end-of-life treatment, with transportation included in all stages. The system process flow diagram is shown in Figure 2. Items shown outside the system boundary in Figure 2 were excluded from the assessment in accordance with the PCR.

Criteria for the inclusion of inputs and outputs:

All components of the coating formulations which comprised more than 0.1% of the manufactured product were included in the study. The models were constructed to meet the minimum of 95% of the

total mass, energy, and environmental relevance of the system, except for items excluded from the study as specified in the PCR.

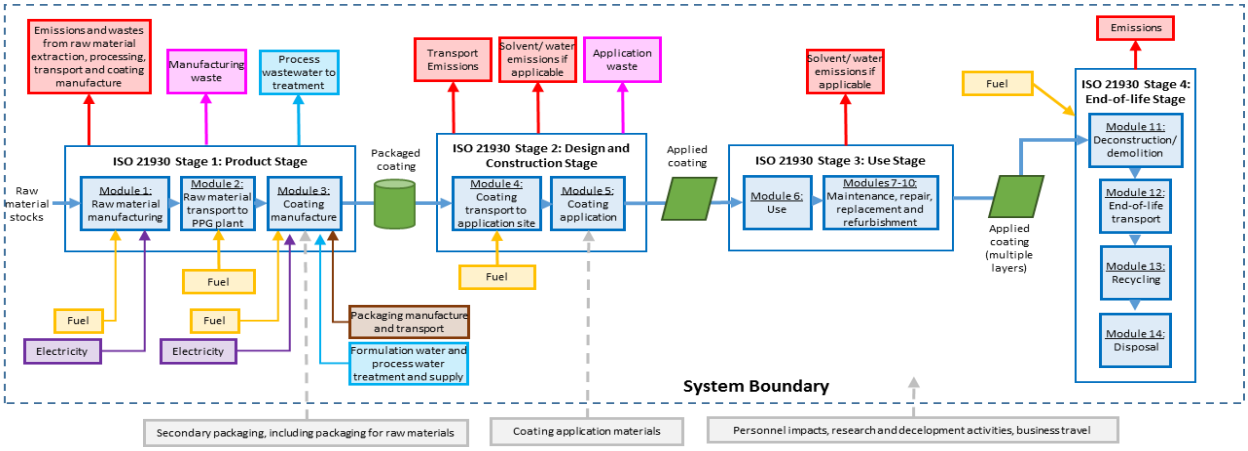

Figure 2 - Process flow diagram and system boundary for this EPD

Life Cycle Impact Assessment Methodology:

The Life Cycle Impact Assessment (LCIA) step of the analysis groups emissions and resource consumption into categories by known environmental impacts to which they contribute, and applies characterization factors to calculate the relative importance of each substance in a category. The U.S.-based TRACI 2.1 (Bare 2011) method was used to calculate the impacts in the following impact categories, in accordance with the PCR:

- Climate change or global warming potential (GWP 100 years) [kg CO_2-eq.]: Biomass carbon uptake and its re-release of CO_2 and CH_4 were reported separately based on the biogenic carbon content of the products.
- Acidification potential of land and water sources (AP) [kg SO_2-eq]:
- Photochemical ozone creation potential (POCP, or "Smog Formation") [kg O_3 eq.]
- Eutrophication potential (EP) [kg N eq.]
- Stratospheric ozone depletion potential (ODP) [kg CFC-11 eq.]

Additional life cycle inventory results reported in accordance with the PCR are the following:

- Depletion of non-renewable energy resources [MJ]
- Depletion of non-renewable material resources [kg]
- Use of renewable primary energy [MJ] - defined as renewable non-fossil energy sources: wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.
- Use of renewable material resources [kg] - defined as materials that can be readily replaced by natural means on a level equal to their consumption.
- Consumption of freshwater [m^3] – limited to the net value between uptake and re-release, accounting only for evaporation and other forms of water displacement.
- Hazardous waste [kg] – as defined by RCRA under 40 CFR 261.33
- Non-hazardous waste [kg]

Key Environmental Parameters:

The LCIA results from the TRACI method for each product are shown in Table 5. Average results for all products included in this EPD are documented and grouped separately into the different life cycle stages from ISO 21930 (as shown in Figure 2) and are shown graphically in Figure 3. Results for individual products are similar to the average product shown.

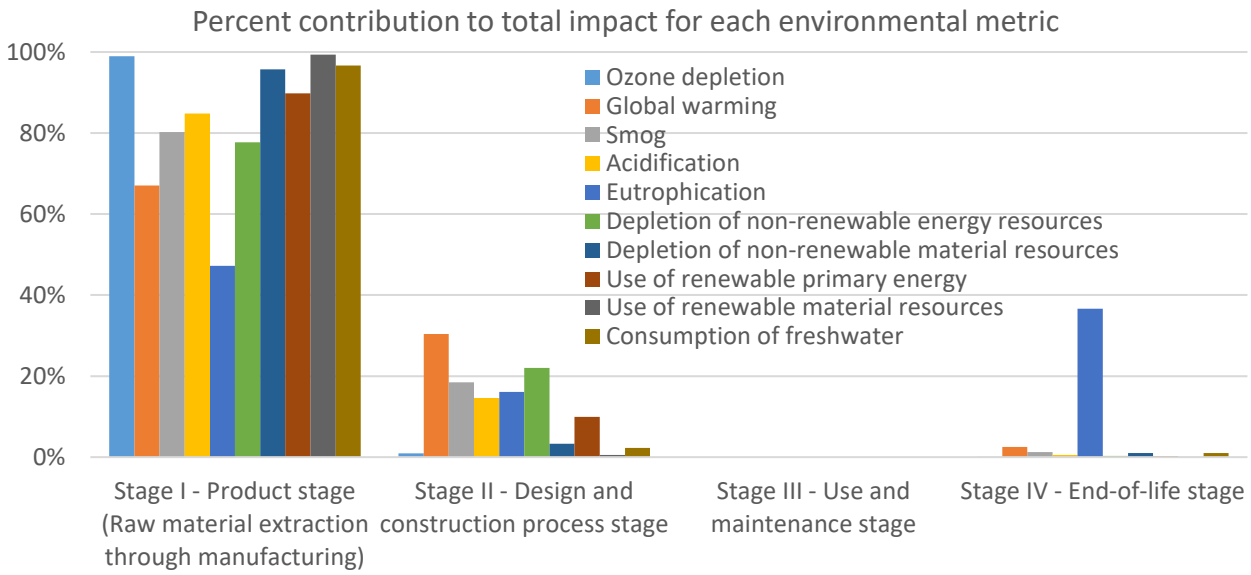

Figure 3 - Graphical impacts for the average *Pitt-Tech Plus EP DTM* product showing % contribution by life cycle stage

Material and Energy resources, Emissions and Wastes:

Additional Life Cycle Inventory Results

The additional inventory results required by the PCR for each product are shown in Table 6. Average results for all products included in this EPD are documented and grouped separately into the different life cycle stages from ISO 21930 (as shown in Figure 2) and are shown graphically in Figure 3.

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Table 5 - LCIA results (TRACI impact categories)

Impact category	Formulations															
	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS W/P BASE	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS MIDTONE BASE	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS NEUTRAL BASE	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS BLACK	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS RED BASE	PITT-TECH® PLUS EP DTM ACRYLIC GLOSS YELLOW BASE	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS W/P BASE	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS MIDTONE BASE	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS NEUTRAL BASE	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS BLACK	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS RED BASE	PITT-TECH® PLUS EP DTM ACRYLIC SEMI-GLOSS YELLOW BASE	PITT-TECH® PLUS EP DTM ACRYLIC SATIN W/P BASE	PITT-TECH® PLUS EP DTM ACRYLIC SATIN MIDTONE BASE	PITT-TECH® PLUS EP DTM ACRYLIC SATIN NEUTRAL BASE	PITT-TECH® PLUS EP DTM ACRYLIC SATIN BLACK
Life cycle impact assessment results for technical life scenario																
Ozone depletion (mg CFC-11 eq)	2.78	1.34	2.73	1.65	2.98	5.13	1.40	1.58	1.40	1.40	8.57	3.27	1.87	3.20	2.95	2.92
Global warming (kg CO2 eq)																
Without biogenic carbon	3.78	1.81	2.88	1.18	2.22	4.03	1.88	1.88	1.46	0.90	4.00	3.78	1.80	3.54	2.97	1.65
With biogenic carbon	*4.02*	*1.91*	*3.01*	*1.26*	*2.32*	*4.22*	*2.00*	*1.98*	*1.53*	*0.96*	*4.18*	*3.95*	*1.92*	*3.73*	*3.12*	*1.77*
Smog (kg O3 eq)	0.20	0.07	0.09	0.09	0.08	0.14	0.10	0.08	0.05	0.05	0.14	0.14	0.09	0.14	0.09	0.09
Acidification (kg SO2 eq)	0.02	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01
Eutrophication (kg N eq)	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Life cycle impact assessment results for market life scenario																
Ozone depletion (mg CFC-11 eq)	4.16	4.01	4.10	4.29	7.75	7.41	4.21	4.73	4.21	4.19	12.38	4.73	5.60	4.80	4.43	4.38
Global warming (kg CO2 eq)																
Without biogenic carbon	5.67	5.43	4.32	3.06	5.76	5.82	5.64	5.65	4.39	2.71	5.77	5.45	5.41	5.31	4.45	2.47
With biogenic carbon	*6.04*	*5.72*	*4.52*	*3.27*	*6.04*	*6.10*	*6.01*	*5.95*	*4.60*	*2.89*	*6.04*	*5.71*	*5.77*	*5.60*	*4.67*	*2.66*
Smog (kg O3 eq)	0.31	0.22	0.14	0.24	0.20	0.21	0.29	0.24	0.15	0.15	0.20	0.20	0.28	0.21	0.14	0.13
Acidification (kg SO2 eq)	0.03	0.02	0.01	0.01	0.02	0.03	0.03	0.02	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.01
Eutrophication (kg N eq)	0.03	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.01

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.

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Table 6 -Additional life cycle inventory results

Impact category	Formulations															
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Additional environmental metrics results for technical life scenario (See note 1)																
Depletion of non-renewable energy resources (MJ)	69.8	34.5	59.8	29.6	43.4	78.8	34.1	35.2	30.1	22.5	74.7	72.9	32.3	66.1	59.9	39.9
Fossil	*66.4*	*33.0*	*57.5*	*28.1*	*41.6*	*75.8*	*32.4*	*33.7*	*29.0*	*21.3*	*71.7*	*70.0*	*30.7*	*63.4*	*57.6*	*37.8*
Nuclear	*3.4*	*1.5*	*2.3*	*1.5*	*1.8*	*3.1*	*1.7*	*1.5*	*1.2*	*1.1*	*3.0*	*2.9*	*1.6*	*2.7*	*2.3*	*2.1*
Depletion of non-renewable material resources (kg)	25.25	10.34	16.34	10.45	11.68	22.55	12.08	10.39	8.05	7.75	18.71	18.88	11.24	18.65	15.10	14.57
Use of renewable primary energy (MJ)	2.60	1.04	1.41	0.78	1.17	2.08	1.33	1.12	0.76	0.64	2.08	2.01	1.22	1.95	1.45	1.09
Bio-based	*1.15*	*0.43*	*0.56*	*0.35*	*0.42*	*0.75*	*0.62*	*0.49*	*0.34*	*0.32*	*0.77*	*0.75*	*0.53*	*0.80*	*0.59*	*0.53*
Wind/Solar/Geothermal	*0.48*	*0.25*	*0.44*	*0.18*	*0.33*	*0.60*	*0.23*	*0.25*	*0.22*	*0.13*	*0.57*	*0.55*	*0.22*	*0.48*	*0.44*	*0.24*
Water	*0.97*	*0.35*	*0.41*	*0.25*	*0.42*	*0.74*	*0.49*	*0.37*	*0.21*	*0.19*	*0.74*	*0.71*	*0.46*	*0.67*	*0.42*	*0.32*
Use of renewable material resources (g)	1.02	0.46	0.82	0.50	0.53	0.98	0.75	0.70	0.66	0.66	0.97	0.99	0.53	0.96	0.88	0.87
Consumption of freshwater (m3)	0.04	0.01	0.01	0.01	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01
Hazardous waste (%)	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
Non-hazardous waste (%)	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%
VOC emissions (g) (Stage II – Application only)	52	26	52	33	33	59	26	26	26	26	59	59	26	52	52	52
Additional environmental metrics results for market life scenario (See note 1)																
Depletion of non-renewable energy resources (MJ)	104.7	103.4	89.8	76.9	112.7	113.9	102.3	105.7	90.4	67.4	108.0	105.3	96.9	99.2	89.9	59.8
Fossil	*99.5*	*99.0*	*86.2*	*72.9*	*108.1*	*109.4*	*97.3*	*101.2*	*86.9*	*63.9*	*103.6*	*101.2*	*92.2*	*95.0*	*86.4*	*56.6*
Nuclear	*5.2*	*4.4*	*3.5*	*3.9*	*4.6*	*4.4*	*5.0*	*4.5*	*3.5*	*3.4*	*4.4*	*4.1*	*4.7*	*4.1*	*3.5*	*3.2*
Depletion of non-renewable material resources (kg)	37.87	31.03	24.51	27.16	30.38	32.57	36.23	31.16	24.14	23.24	27.02	27.28	33.73	27.98	22.65	21.86
Use of renewable primary energy (MJ)	3.90	3.11	2.12	2.02	3.04	3.01	4.00	3.35	2.29	1.93	3.01	2.90	3.65	2.92	2.17	1.64
Bio-based	*1.7*	*1.3*	*0.8*	*0.9*	*1.1*	*1.1*	*1.8*	*1.5*	*1.0*	*1.0*	*1.1*	*1.1*	*1.6*	*1.2*	*0.9*	*0.8*
Wind/Solar/Geothermal	*0.7*	*0.7*	*0.7*	*0.5*	*0.9*	*0.9*	*0.7*	*0.8*	*0.7*	*0.4*	*0.8*	*0.8*	*0.7*	*0.7*	*0.7*	*0.4*
Water	*1.5*	*1.1*	*0.6*	*0.6*	*1.1*	*1.1*	*1.5*	*1.1*	*0.6*	*0.6*	*1.1*	*1.0*	*1.4*	*1.0*	*0.6*	*0.5*
Use of renewable material resources (g)	1.53	1.38	1.23	1.30	1.39	1.42	2.24	2.09	1.98	1.97	1.40	1.42	1.60	1.45	1.32	1.30
Consumption of freshwater (m3)	0.06	0.04	0.02	0.02	0.01	0.03	0.06	0.04	0.02	0.02	0.01	0.03	0.05	0.04	0.02	0.02
Hazardous waste (%)	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
Non-hazardous waste (%)	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%
VOC emissions (g) (Stage II – Application only)	78	78	78	85	85	85	78	78	78	78	85	85	78	78	78	78

Note 1: The LCA did not explicitly include measurable amounts of secondary fuels or secondary/recycled materials.

Emissions to Water, Soil, and to Indoor Air:

Because coatings are a passive product during use, the only impacts occurring during this phase are generally due to the off-gassing of material components in the paint. The quantity of VOC emissions during the use phase for *PITT-TECH* plus products are assumed to equal the EPA Method 24 listed VOC contents on the label and are shown in Table 6.

LCA Interpretation

The LCA results show that the raw materials (Stage I, Module 1) tend to contribute highly to the impact of many indicators. This high contribution of raw materials to the impact indicators is not unexpected. As paints are primarily mixtures of pre-processed ingredients, much of the expenditure of energy, raw materials, processing, waste processing, etc. in bringing the product to existence has occurred prior to the entry of the raw materials onto the PPG production site. The majority of the impact of the raw materials comes from the titanium dioxide and the binder. This is typical for coatings products since these two raw materials are often present in high proportions and have a relatively high processing energy demand. The use phase contributes no impacts because maintenance repainting is calculated as a multiple of the initial impacts for the raw materials, manufacturing, transport and application (Stages I and II) of each product.

Additional Environmental Information:

Environmental Certifications

Pitt-Tech Plus EP DTM coatings meet the most stringent VOC regulations nationwide, are GREENGUARD® certified and GREENGUARD Gold certified. The specific GREENGUARD certificates are available online at www.greenguard.org.

Preferred End-of Life Options:

Please visit www.paintcare.org for information about disposing unused latex paint. If possible, unused paint should be taken to an appropriate recycling/take-back center or disposed of in accordance with local environmental regulatory agency guidance.

Data Quality Assessment:

To assess the input quality of the specific product data used in the LCA modeling, the pedigree matrix developed by Weidema and Wesnaes (1996) was used. The pedigree matrix rates data on a scale of 1 to 5 (1-poor, 2-fair, 3-good, 4-very good, 5-excellent) for each of 5 rating criteria: reliability of source, completeness, temporal correlation, geographical correlation, and technological correlation. Primary data for the year 2015 was obtained from PPG environmental reporting systems dealing with manufacturing plant operations. When primary data was for processes not directly under PPG's control, data was taken from the ecoinvent v3.1 database. ecoinvent is widely accepted by the LCA community. The regional U.S. electric power grid generation mix for each plant was used in the LCA model according to the percentage of product made at that plant. The primary data is considered to be of excellent quality and ecoinvent very good. Because the transportation, application and disposal stages contained several assumptions specified in the PCR, these stages received a minimum score of good. Considering that the majority of

environmental impact is in the stages for which the data was of higher quality, the overall data quality rating was assessed as Very Good.

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Glossary:

Acronyms & Abbreviated Terms:

- ACA: American Coating Association
- ASTM: A standards development organization that serves as an open forum for the development of international standards. ASTM methods are industry-recognized and approved test methodologies for demonstrating the durability of an architectural coating in the United States.
- ecoinvent: a life cycle database that contains international industrial life cycle inventory data on energy supply, resource extraction, material supply, chemicals, metals, agriculture, waste management services, and transport services.
- EPA WARM model: Unite States Environmental Protection Agency Waste Reduction Model.
- EPD: Environmental Product Declaration. EPDs are form of as Type III environmental declarations under ISO 14025. They are the summary document of data collected in the LCA as specified by a relevant PCR. EPDs can enable comparison between products if the underlying studies and assumptions are similar.
- GaBi: Created by PE INTERNATIONAL GaBi Databases are LCA databases that contain ready-to-use Life Cycle Inventory profiles.
- LCA: Life Cycle Assessment or Analysis. A technique to assess environmental impacts associated with all the stages of a product's life from cradle to grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).
- NCSS: NSF International's National Center for Sustainability Standards
- PCR: Product Category Rule. A PCR defines the rules and requirements for creating EPDs of a certain product category.
- TRACI: Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts.
- VOC: Volatile organic compounds

Terminology from the PCR:

- Architectural coating: a coating recommended for field application to stationary structures or their appurtenances at the site of installation, to portable buildings, to pavements, or to curbs. For purposes of the PCR an 'architectural coating' does not include adhesives and coatings for shop applications or original equipment manufacturing, nor does it include coatings solely for application to non-stationary structures, such as airplanes, ships, boats, and railcars. Please see the product category requirements in Section 1.1 of the PCR. General architectural coatings are decorative or protective paints or coatings formulated for interior or exterior architectural substrates including, but not limited to: drywall, stucco, wood, metal, concrete, and masonry. Primers, sealers and undercoaters are coatings formulated for one or more of the following purposes: to provide a firm bond between the substrate and the subsequent coatings; to prevent subsequent coatings from being absorbed by the substrate; or to prevent harm to subsequent coatings by materials in the substrate; or to provide a smooth surface for the subsequent application of coatings; or to provide a clear finish coat to seal the substrate; or to prevent materials from penetrating into or leaching out of a substrate. Interior architectural coatings are defined as coatings that meet the product category requirements in section 1.1 of the PCR and that are applied to substrates that primarily reside in interior.
- Biologic growth or bio deterioration: any undesirable change in material properties brought about by the activities of microorganisms.
- Blistering: the formation of dome shaped hollow projections in paints or varnish films resulting from the local loss of adhesion and lifting of the film from the surface or coating.
- Burnish resistance: the resistance of a coating to an increase in gloss or sheen due to polishing or rubbing.
- Design life: The estimated lifetime of a coating based solely on its hiding and performance characteristics determined by results in certain ASTM durability tests.
- Durability: the degree to which coatings can withstand the destructive effect of the conditions to which they are subjected and how long they retain an acceptable appearance and continue to protect the substrate.
- Erosion: the wearing away of the top coating of a painted surface e.g., by chalking, or by the abrasive action of windborne particles of grit, which may result in exposure of the underlying surface. The degree of resistance is dependent on the amount of coating retained.
- Flaking/Peeling: the phenomenon manifested in paint films by the actual detachment of pieces of the film itself either from its substrate or from paint previously applied. Peeling can be considered as an aggravated form of flaking. It is frequently due to the collection of moisture beneath the film.
- Gloss: a value of specular reflection which is often used to categorize certain types of paints.
- Intermediate processing: the conversion of raw materials to intermediates (e.g. titanium dioxide ore into titanium dioxide pigment, etc.).
- Market-based life: The estimated lifetime of a coating based off the actual use pattern of the product type. In this instance, a repaint may occur before the coating fails.
- Pigment: the material(s) that give a coating its color.
- Primary materials: resources extracted from nature. Examples include titanium dioxide ore, crude oil, etc. that are used to create basic materials used in the production of architectural coatings (e.g., titanium dioxide).
- Resin/Binder: acts as the glue or adhesive to adhere the coating to the substrate.
- Scrubbability or scrub resistance: the ability of a coating to resist being worn away or to maintain its original appearance when rubbed repetitively with an abrasive material.
- Secondary materials: recovered, reclaimed, or recycled content that is used to create basic materials to be used in the production of architectural coatings.
- Washability: the ease with which the dirt can be removed from a paint surface by washing; also refers to the ability of the coating to withstand washing without removal or substantial damage.