

**Declaration Owner**

Len-Tex Corporation
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Product

- Vinyl Wallcoverings on Non-woven Backing
- Vinyl Wallcoverings on Woven Backing

Declared Unit

The declared unit is one square meter of wallcovering

EPD Number and Period of Validity

SCS-EPD-05287
EPD Valid January 7, 2019 through January 6, 2024

Product Category Rule

Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. Version 1.7, 2018.

Part B: Requirements on the EPD for Wall coverings. Version 1.1, 2016.

Addendum for Adapting the IBU PCR Part B for use in North America: Guidance to the IBU Part B: Requirements on the EPD for Wall Coverings. SCS Global Services. v2.0. September 14, 2017.

Program Operator

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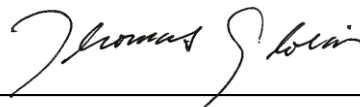
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Disclaimers: This EPD conforms to ISO 14025, 14040, ISO 14044, and EN 15804.

Scope of Results Reported: The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.

Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.

Comparability: The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

PCR review, was conducted by	Institut Bauen und Umwelt e.V., (IBU).
Approved Date: January 7, 2019 – End Date: January 6, 2024	
Independent verification of the declaration and data, according to ISO 14025:2006. EN 15804 serves as the core PCR	<input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier	 Tom Gloria, PhD, Industrial Ecology Consultants

1. About Len-Tex

Len-Tex Corporation is a leading manufacturer of contract wallcoverings, providing an extensive range of design options for the hospitality, healthcare, corporate, institutional and retail markets. Since our founding in 1983, we have remained dedicated to producing beautiful, durable wallcoverings which promote healthier indoor air quality (IAQ). With 100% of our product components, including films, inks, coatings, adhesives and fabrics, being exclusively made in the U.S.A, we are proud to play a part in safeguarding American jobs.

2. Product

2.1 Product Description

Len-Tex wallcoverings represented in this EPD are manufactured in Walpole, New Hampshire. The products under scope include two thicknesses (15 oz. per linear yard and 20 oz. per linear yard, referred to as 15 oz. and 20 oz., respectively) of plasticized polyvinyl chloride (vinyl) wallcoverings with either a woven or non-woven backing. The non-woven backing is a substrate composed of a mixture of cellulose and polyethylene terephthalate (PET) fibers. The woven backing is a substrate composed of a mixture of cotton and polyester fibers. Len-Tex vinyl wallcovering products include a proprietary Aqua-Clear low VOC water-based topcoat and can be customized with a wide range of colors and designs.

2.2 Application

The vinyl woven and non-woven wallcovering products are intended for use in commercial applications.

2.3 Technical Data

Table 1. Product specifications for Len-Tex wallcoverings with non-woven backing.

Property	Test Method	Test Results
Building Code Classification	2015 Intl. Building Code Sec. 803.1.1	Class A
Flame Spread Index	ASTM E84	10
Smoke Developed Index	ASTM E84	120
Heat Release	NFPA 286	< 288 kW
Smoke Release	NFPA 286	< 1000 m ²

Table 2. Product specifications for Len-Tex wallcoverings with woven backing.

Property	Test Method	Test Results
Building Code Classification	2015 Intl. Building Code Sec. 803.1.1	Class A
Flame Spread Index	ASTM E84	15
Smoke Developed Index	ASTM E84	10
Heat Release	NFPA 286	< 249 kW
Smoke Release	NFPA 286	< 1000 m ²

2.4 Delivery Status

Product dimensions are 4' (1.22 meter) maximum width with 30 yard (27.4 meter) length per rolled sheet and include woven and non-woven backings. The vinyl wallcovering products in this EPD are based on a 4' width in two weights per linear yard, 15 oz. and 20 oz. per linear yard (0.381 kg and 0.509 kg per square meter, respectively).

2.5 Base Materials

The material composition and recycled content of the components used for the production of vinyl wallcovering products represented in this EPD are shown below.

Table 3. Material content of 15 oz. vinyl wallcovering with non-woven backing, including pre- and post-consumer material.

Component	Material	Amount (kg/m ²)	Percent of Total	Pre-Consumer (%)	Post-Consumer (%)
Substrate	Polyvinyl chloride film	0.29	76%	0.0%	0.0%
Backing	Polyethylene terephthalate, Cellulose fibers	5.3x10 ⁻²	14%	50%	0.0%
Adhesive	Polyvinyl chloride, Citrate	3.6x10 ⁻²	10%	0.0%	0.0%
Ink	Pigment	1.0x10 ⁻³	0.27%	0.0%	0.0%
Coating	Proprietary	5.9x10 ⁻⁴	0.15%	0.0%	0.0%
Extender	Proprietary	2.9x10 ⁻⁴	0.077%	0.0%	0.0%
TOTAL		0.38	100%	7.0%	0.0%

Table 4. Material content of 20 oz. vinyl wallcovering with non-woven backing, including pre- and post-consumer material.

Component	Material	Amount (kg/m ²)	Percent of Total	Pre-Consumer (%)	Post-Consumer (%)
Substrate	Polyvinyl chloride film	0.39	76%	0.0%	0.0%
Backing	Polyethylene terephthalate, Cellulose fibers	7.1x10 ⁻²	14%	50%	0.0%
Adhesive	Polyvinyl chloride, Citrate	4.8x10 ⁻²	10%	0.0%	0.0%
Ink	Pigment	1.4x10 ⁻³	0.27%	0.0%	0.0%
Coating	Proprietary	7.8x10 ⁻⁴	0.15%	0.0%	0.0%
Extender	Proprietary	3.9x10 ⁻⁴	0.077%	0.0%	0.0%
TOTAL		0.51	100%	7.0%	0.0%



Table 5. Material content of 15 oz. vinyl wallcovering with woven backing, including pre- and post-consumer material.

Component	Material	Amount (kg/m ²)	Percent of Total	Pre-Consumer (%)	Post-Consumer (%)
Substrate	Polyvinyl chloride film	0.29	76%	0.0%	0.0%
Backing	Cotton fiber, Polyethylene terephthalate, Dacron	5.3x10 ⁻²	14%	50%	0.0%
Adhesive	Polyvinyl chloride, Citrate	3.6x10 ⁻²	10%	0.0%	0.0%
Ink	Pigment	1.0x10 ⁻³	0.27%	0.0%	0.0%
Coating	Proprietary	5.9x10 ⁻⁴	0.15%	0.0%	0.0%
Extender	Proprietary	2.9x10 ⁻⁴	0.077%	0.0%	0.0%
TOTAL		0.38	100%	7.0%	0.0%

Table 6. Material content of 20 oz. vinyl wallcovering with woven backing, including pre- and post-consumer material.

Component	Material	Amount (kg/m ²)	Percent of Total	Pre-Consumer (%)	Post-Consumer (%)
Substrate	Polyvinyl chloride film	0.39	76%	0.0%	0.0%
Backing	Cotton fiber, Polyethylene terephthalate, Dacron	7.1x10 ⁻²	14%	50%	0.0%
Adhesive	Polyvinyl chloride, Citrate	4.8x10 ⁻²	10%	0.0%	0.0%
Ink	Pigment	1.4x10 ⁻³	0.27%	0.0%	0.0%
Coating	Proprietary	7.8x10 ⁻⁴	0.15%	0.0%	0.0%
Extender	Proprietary	3.9x10 ⁻⁴	0.077%	0.0%	0.0%
TOTAL		0.51	100%	7.0%	0.0%

2.6 Manufacture

For non-woven backing product, a base web is created by mixing wood pulp sheet and polyethylene terephthalate fibers. Alternatively, for woven backing product, a base web is made of woven textiles. Prior to printing, the backing is coated with polyvinyl chloride sheet, which include some additives that enhance the ease of handling, opacity, and drapability of the paper. The intermediate wallcovering product is then sent for printing with inks, followed by any laminating or embossing. Before the wallcovering is cut to length and wound, it is trimmed and slit. The final product is wrapped and packaged and then shipped to customer.

2.7 Product Processing/ Installation

Typical installation involves preparation of the wall surface with a primer, followed by application of an adhesive.

Manufacturer recommended installation instructions are available on their website:

<https://lentexwallcoverings.com/installation-instructions/>

2.8 Packaging

The amount of packaging used for the final products in this EPD and their pre- and post-consumer materials are provided in Table 7.

Table 7. Material composition of vinyl wallcovering packaging, including pre- and post-consumer material.

Component	Material	Amount (kg/m ²)	Percent of Total	Pre-Consumer (%)	Post-Consumer (%)
Pallets	Wood	2.4x10 ⁻²	73%	0.00%	100%
Stretch wrap	Low-density polyethylene	3.4x10 ⁻³	10%	0.00%	0.00%
Natural Kraft sheet	Kraft paper	2.7x10 ⁻³	8.2%	50.0%	50.0%
Polyester strapping	Polyester	1.4x10 ⁻³	4.1%	0.00%	0.00%
Grey bags*	Polyethylene	6.8x10 ⁻⁴	2.0%	30.0%	0.00%
Cores	Corrugated board	6.8x10 ⁻⁴	2.0%	0.00%	100%
Packing tape	Liner with adhesive	1.9x10 ⁻⁴	0.57%	0.00%	0.00%
TOTAL		3.3x10⁻²	100%	4.7%	79%

*Grey bags are used in international shipments only

2.9 Condition of Use

No special conditions of use are noted.

2.10 Environment and Health during use

No environmental or health impacts are expected due to normal use of the wallcovering product.

2.11 Extraordinary Effects

No environmental or health impacts are expected due to extraordinary effects including fire and/or water damage and product destruction.

2.12 Re-Use Phase

Commercial wallcoverings are not typically reused or recycled at end-of-life, however, Len-Tex has an End-of-Life Return Program: <https://lentexwallcoverings.com/reclamation-overview/>

2.13 Disposal

At end-of-life, the wall covering may be disposed of in a landfill, incinerated, or returned to Len-Tex.

European Waste Code: 07 02 13 (Waste Plastic)

2.14 Further Information

Further information on the product can be found on the manufacturers' website: <https://lentexwallcoverings.com/product-information/>

3. LCA: Calculation Rules

3.1 Functional Unit

The declared unit used in the study, as specified in the PCR, is 1 m² of wallcovering. The reference flow for the woven and non-woven backings 0.381 kg and 0.509 kg per square meter, respectively.

3.2 System Boundary

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, transportation, and product manufacture. The life cycle phases included in each product system boundary are shown below.

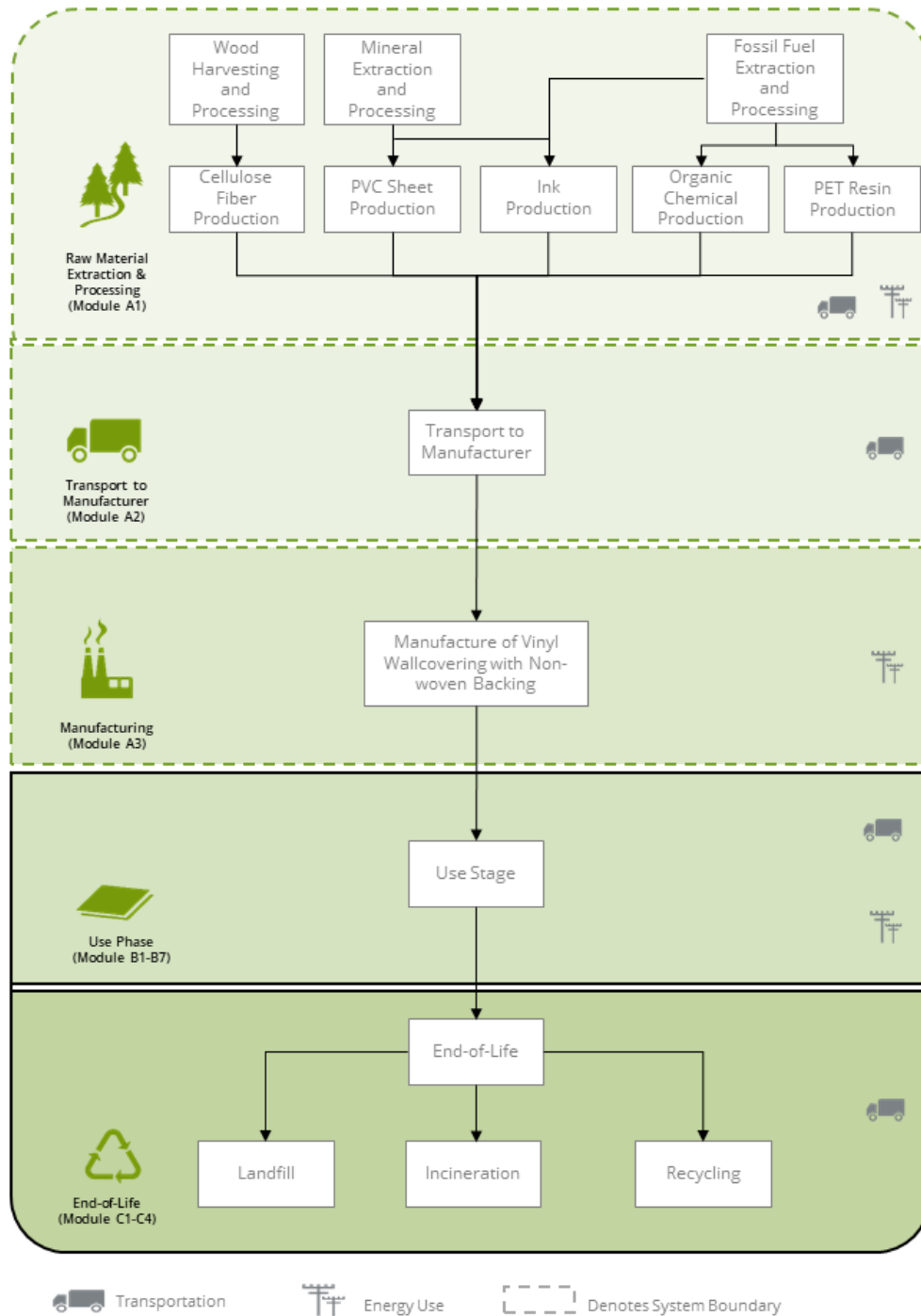


Figure 1. Product system for Len-Tex vinyl wallcovering with non-woven backing.

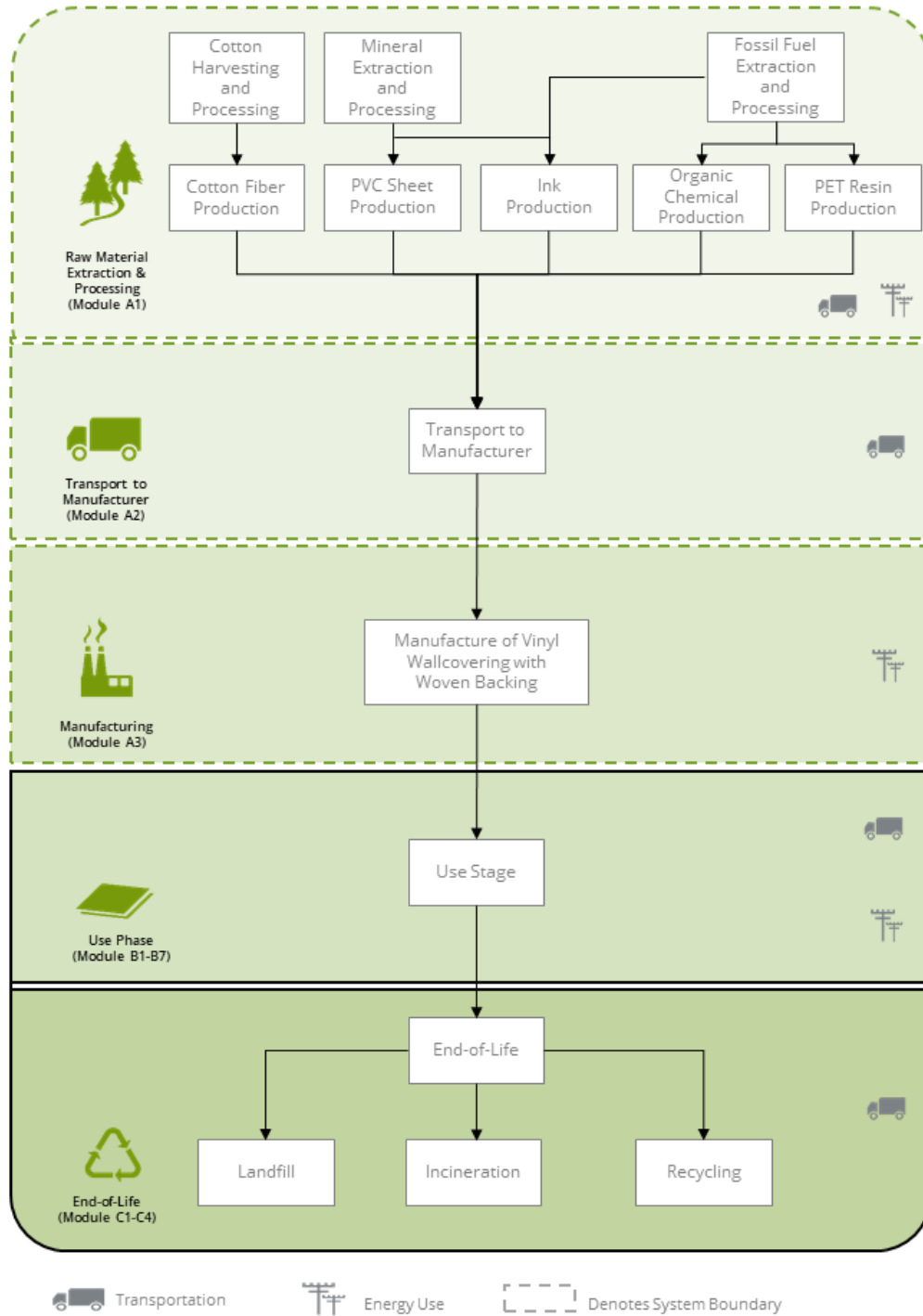


Figure 2. Product system for Len-Tex vinyl wallcovering with woven backing.

3.3 Estimates and Assumptions

- Representative inventory data were used to reflect the energy mix for electricity use at the manufacturing facility. Ecoinvent datasets were modified to reflect the NEWE eGRID subregion energy mix and transmission in order to estimate resource use and emissions from electricity use.
- For some material ingredients used in product manufacturing, a proxy material dataset was used that was deemed appropriate and representative. This includes some material ingredients for creating the composition of extenders and coatings.
- Len-Tex has two different packaging options, depending on whether final product is transported domestically or internationally. For international shipments, the final product uses the same packaging as domestic shipments, but also includes the use of grey bags. The amount of packaging material used for final product is based on a weighted average of domestic and international shipments (80% and 20%, respectively).
- For nonhazardous waste generated during manufacturing, it is assumed that 20% is incinerated and 80% go to landfill. Transportation of nonhazardous materials to disposal assumes a 20 mile (32 km) distance by truck, consistent with assumptions made in the US Environmental Protection Agency's WARM model.

It should also be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The PCR allows for the results for several inventory flows related to construction products to be reported as “other parameters”. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.4 Cut-off criteria

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results.



3.5 Background Data

Primary data were provided by Len-Tex for their manufacturing facility, product material composition and packaging, and the supplier distances and modes of transportation. The sources of secondary LCI data are from the Ecoinvent v3.4 database.

Table 8. LCI datasets and associated databases used to model Len-Tex vinyl wallcoverings.

Flow	Dataset	Database Source(s)	Database Year
Product Materials			
Adhesive	market for citric acid citric acid Cutoff, U – GLO; market for polyvinylchloride, bulk polymerised polyvinylchloride, bulk polymerised Cutoff, U – GLO	Ecoinvent v3.4	2017
Backing: Non-woven	market for cellulose fibre, inclusive blowing in cellulose fibre, inclusive blowing in Cutoff, U – GLO; market for chemical, organic chemical, organic Cutoff, U – GLO; market for polyethylene terephthalate, granulate, amorphous polyethylene terephthalate, granulate, amorphous Cutoff, U – GLO; market for polyethylene terephthalate, granulate, amorphous, recycled polyethylene terephthalate, granulate, amorphous, recycled Cutoff, U – US	Ecoinvent v3.4	2017
Backing: Woven	market for cotton fibre cotton fibre Cutoff, U – GLO; market for polyethylene terephthalate, granulate, amorphous polyethylene terephthalate, granulate, amorphous Cutoff, U – GLO; market for titanium dioxide titanium dioxide Cutoff, U – RoW	Ecoinvent v3.4	2017
Coating	market for chemical, organic chemical, organic Cutoff, U – GLO; market for water, deionised, from tap water, at user water, deionised, from tap water, at user Cutoff, U – RoW	Ecoinvent v3.4	2017
Extender	market for chemical, organic chemical, organic Cutoff, U – GLO; market for water, deionised, from tap water, at user water, deionised, from tap water, at user Cutoff, U – RoW	Ecoinvent v3.4	2017
PVC Film	extrusion production, plastic film extrusion, plastic film Cutoff, U – RoW; market for polyvinylchloride, suspension polymerised polyvinylchloride, suspension polymerised Cutoff, U – GLO; 2-ethylhexyl phthalate (DEHP) {GLO} market for Alloc Rec; market for aluminium hydroxide aluminium hydroxide Cutoff, U – GLO; market for calcium carbonate, precipitated calcium carbonate, precipitated Cutoff, U – GLO; market for polyvinylchloride, suspension polymerised polyvinylchloride, suspension polymerised Cutoff, U – GLO; market for soybean oil, refined soybean oil, refined Cutoff, U – GLO; market for zinc oxide zinc oxide Cutoff, U – GLO	Ecoinvent v3.4; Overcash ¹	2017
Pigments	market for carbon black carbon black Cutoff, U – GLO; market for chemical, organic chemical, organic Cutoff, U – GLO; market for water, deionised, from tap water, at user water, deionised, from tap water, at user Cutoff, U – RoW; market for aluminium oxide aluminium oxide Cutoff, U – GLO; market for titanium dioxide titanium dioxide Cutoff, U – RoW	Ecoinvent v3.4	2017
Electricity/Heat/Resources for Manufacturing			
Electricity	Electricity, medium voltage, at grid/NEWE 2016 U	Ecoinvent v3.4; eGRID2016	2017; 2017
Natural Gas	market for heat, district or industrial, natural gas heat, district or industrial, natural gas Cutoff, U – RoW	Ecoinvent v3.4	2017
Transportation			
Truck	market for transport, freight, lorry 16-32 metric ton, EURO4 transport, freight, lorry 16-32 metric ton, EURO4 Cutoff, U – GLO	Ecoinvent v3.4	2017

¹ Overcash, M. LCI gate-to-gate database, Department of Chemical and Biomolecular Engineering, NCSU, Raleigh, NC, 1998-2004. Data for: 2-ethylhexyl phthalate (DEHP).

3.6 Data Quality

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 9. Data quality assessment for the EPD.

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	Manufacturing data are based on 2017 annual production. Representative datasets (secondary data) used for upstream and background processes are generally less than 5 years old. All primary data used represented an average of at least one year's worth of data collection.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Representative data used in the assessment are representative of US, Global, or "Rest-of-World" (average for all countries in the world with uncertainty adjusted). Datasets chosen are considered sufficiently similar to actual geographical coverage of processes. Furthermore, regional information allowed for specific energy mixes for electricity use to be modeled.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one year and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	Except where noted, the LCA model included all known mass and energy flows. In some instances, surrogate data used to represent upstream operations may be missing some data which is propagated in the model. No known processes or activities were excluded; in total, these missing data represent less than 5% of the cumulative omitted mass or energy flows.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	<p>Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials.</p> <p>Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed primary data collection throughout the supply chain back to resource extraction. Some proxy datasets are used to represent material ingredients due to the lack of specific datasets available.</p>
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used, which are taken from Ecoinvent v3.4. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	The following primary data were provided: 1) Material types and amounts required for manufacturing and packaging of the final product, including scrap rate; 2) material composition for several material inputs used for manufacturing of final product; 3) Upstream transport of materials for manufacturing and packaging of final product; specifically, modes and distances; 4) Annual production, resource use (e.g., electricity, natural gas), waste, and emissions released at the manufacturing facility. Where primary upstream data were unavailable, secondary data were taken from Ecoinvent v3.4.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to the product materials and packaging is low. Data for upstream operations relied upon use of existing representative datasets. These datasets contained relatively recent data (<5 years), but lacked specific geographical representativeness with the exception of a regionalized electricity grid. Uncertainty related to the impact assessment methods used in the study are high. The impact methods required by the PCR include impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 Period under review

The period of review is calendar year 2017.

3.8 Allocation

For the raw material supply and all secondary datasets used for this EPD, processes were modelled using the cut-off system model of Ecoinvent v3.4 database. For the transport stage, impacts were allocated based on the mass of the material and distance transported to each facility. For the manufacturing stage, mass allocation was deemed the most accurate and reproducible way of calculating resource use, emissions, and wastes.

3.9 Comparability

The Product Category Rule (PCR) this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

4. LCA: Results

Table 10. Life cycle phases included in the product system boundary.

Product			Construction Process		Use							End-of-life				Benefits & loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module included | MND = Module not declared

Table 11. TRACI Life Cycle Impact Assessment (LCIA) results for 1 m² 15 oz. vinyl wallcovering with non-woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	ODP (kg CFC-11 eq)	AP (kg SO ₂ eq)	EP (kg N eq)	SP (kg O ₃ eq)	FFD (MJ)
Total	1.4 100%	1.2x10 ⁻⁷ 100%	5.4x10 ⁻³ 100%	3.2x10 ⁻³ 100%	7.7x10 ⁻² 100%	2.7 100%
A1	1.1 79%	7.2x10 ⁻⁸ 60%	4.4x10 ⁻³ 83%	2.8x10 ⁻³ 85%	5.6x10 ⁻² 74%	2.2 80%
A2	0.16 11%	3.9x10 ⁻⁸ 32%	7.3x10 ⁻⁴ 14%	1.8x10 ⁻⁴ 5.5%	1.7x10 ⁻² 23%	0.33 12%
A3	0.13 9.1%	9.7x10 ⁻⁹ 8.0%	2.0x10 ⁻⁴ 3.8%	3.1x10 ⁻⁴ 9.5%	2.9x10 ⁻³ 3.7%	0.21 7.8%

Table 12. TRACI Life Cycle Impact Assessment (LCIA) results for 1 m² 20 oz. vinyl wallcovering with non-woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	ODP (kg CFC-11 eq)	AP (kg SO ₂ eq)	EP (kg N eq)	SP (kg O ₃ eq)	FFD (MJ)
Total	1.9 100%	1.6x10 ⁻⁷ 100%	7.1x10 ⁻³ 100%	4.3x10 ⁻³ 100%	0.10 100%	3.6 100%
A1	1.5 80%	9.6x10 ⁻⁸ 60%	5.9x10 ⁻³ 83%	3.7x10 ⁻³ 85%	7.5x10 ⁻² 74%	2.9 81%
A2	0.21 11%	5.2x10 ⁻⁸ 32%	9.7x10 ⁻⁴ 14%	2.4x10 ⁻⁴ 5.5%	2.3x10 ⁻² 23%	0.44 12%
A3	0.16 8.6%	1.2x10 ⁻⁸ 7.7%	2.4x10 ⁻⁴ 3.3%	3.9x10 ⁻⁴ 9.1%	3.4x10 ⁻³ 3.3%	0.26 7.3%

Table 13. TRACI Life Cycle Impact Assessment (LCIA) results for 1 m² 15 oz. vinyl wallcovering with woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	ODP (kg CFC-11 eq)	AP (kg SO ₂ eq)	EP (kg N eq)	SP (kg O ₃ eq)	FFD (MJ)
Total	1.5 100%	1.3x10 ⁻⁷ 100%	6.2x10 ⁻³ 100%	3.8x10 ⁻³ 100%	8.3x10 ⁻² 100%	2.9 100%
A1	1.2 81%	8.0x10 ⁻⁸ 62%	5.3x10 ⁻³ 85%	3.3x10 ⁻³ 87%	6.3x10 ⁻² 76%	2.3 81%
A2	0.16 11%	3.9x10 ⁻⁸ 30%	7.3x10 ⁻⁴ 12%	1.8x10 ⁻⁴ 4.7%	1.7x10 ⁻² 21%	0.33 11%
A3	0.13 8.6%	9.7x10 ⁻⁹ 7.5%	2.0x10 ⁻⁴ 3.3%	3.1x10 ⁻⁴ 8.1%	2.9x10 ⁻³ 3.4%	0.21 7.4%

Table 14. TRACI Life Cycle Impact Assessment (LCIA) results for 1 m² 20 oz. vinyl wallcovering with woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	ODP (kg CFC-11 eq)	AP (kg SO ₂ eq)	EP (kg N eq)	SP (kg O ₃ eq)	FFD (MJ)
Total	2.0 100%	1.7x10 ⁻⁷ 100%	8.2x10 ⁻³ 100%	5.1x10 ⁻³ 100%	0.11 100%	3.8 100%
A1	1.6 81%	1.1x10 ⁻⁷ 63%	7.0x10 ⁻³ 85%	4.4x10 ⁻³ 88%	8.4x10 ⁻² 76%	3.1 82%
A2	0.21 11%	5.2x10 ⁻⁸ 30%	9.7x10 ⁻⁴ 12%	2.4x10 ⁻⁴ 4.7%	2.3x10 ⁻² 21%	0.44 12%
A3	0.16 8.1%	1.2x10 ⁻⁸ 7.2%	2.4x10 ⁻⁴ 2.9%	3.9x10 ⁻⁴ 7.7%	3.4x10 ⁻³ 3.1%	0.26 6.9%

Table 15. CML-IA Life Cycle Impact Assessment (LCIA) results for 1 m² 15 oz. vinyl wallcovering with non-woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	AP (kg SO ₂ eq)	POCP (kg C ₂ H ₄ eq)	EP (kg PO ₄ ³⁻ eq)	ODP (kg CFC-11 eq)	ADPE* (kg Sb eq)	ADPF (MJ)
Total	1.3 100%	5.2x10 ⁻³ 100%	2.9x10 ⁻⁴ 100%	2.2x10 ⁻³ 100%	9.5x10 ⁻⁸ 100%	7.8x10 ⁻⁶ 100%	23 100%
A1	1.0 78%	4.4x10 ⁻³ 84%	2.5x10 ⁻⁴ 84%	1.9x10 ⁻³ 87%	5.8x10 ⁻⁸ 61%	7.2x10 ⁻⁶ 92%	19 83%
A2	0.16 12%	6.3x10 ⁻⁴ 12%	2.7x10 ⁻⁵ 9.3%	1.4x10 ⁻⁴ 6.5%	2.9x10 ⁻⁸ 31%	4.8x10 ⁻⁷ 6.2%	2.4 11%
A3	0.13 9.8%	1.9x10 ⁻⁴ 3.7%	1.8x10 ⁻⁵ 6.3%	1.5x10 ⁻⁴ 6.7%	8.0x10 ⁻⁹ 8.4%	1.1x10 ⁻⁷ 1.4%	1.5 6.7%

*This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources

Table 16. CML-IA Life Cycle Impact Assessment (LCIA) results for 1 m² 20 oz. vinyl wallcovering with non-woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	AP (kg SO ₂ eq)	POCP (kg C ₂ H ₄ eq)	EP (kg PO ₄ ³⁻ eq)	ODP (kg CFC-11 eq)	ADPE* (kg Sb eq)	ADPF (MJ)
Total	1.7 100%	6.9x10 ⁻³ 100%	3.9x10 ⁻⁴ 100%	2.9x10 ⁻³ 100%	1.3x10 ⁻⁷ 100%	1.0x10 ⁻⁵ 100%	30 100%
A1	1.3 78%	5.9x10 ⁻³ 85%	3.3x10 ⁻⁴ 85%	2.6x10 ⁻³ 87%	7.7x10 ⁻⁸ 61%	9.6x10 ⁻⁶ 93%	25 83%
A2	0.21 13%	8.4x10 ⁻⁴ 12%	3.6x10 ⁻⁵ 9.3%	1.9x10 ⁻⁴ 6.6%	3.9x10 ⁻⁸ 31%	6.4x10 ⁻⁷ 6.2%	3.2 11%
A3	0.16 9.3%	2.2x10 ⁻⁴ 3.2%	2.3x10 ⁻⁵ 5.8%	1.9x10 ⁻⁴ 6.4%	1.0x10 ⁻⁸ 8.1%	1.2x10 ⁻⁷ 1.2%	1.9 6.2%

*This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources

Table 17. CML-IA Life Cycle Impact Assessment (LCIA) results for 1 m² 15 oz. vinyl wallcovering with woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	AP (kg SO ₂ eq)	POCP (kg C ₂ H ₄ eq)	EP (kg PO ₄ ³⁻ eq)	ODP (kg CFC-11 eq)	ADPE* (kg Sb eq)	ADPF (MJ)
Total	1.3 100%	5.9x10 ⁻³ 100%	3.2x10 ⁻⁴ 100%	2.6x10 ⁻³ 100%	1.0x10 ⁻⁷ 100%	5.2x10 ⁻⁶ 100%	24 100%
A1	1.0 78%	5.1x10 ⁻³ 86%	2.7x10 ⁻⁴ 86%	2.3x10 ⁻³ 89%	6.5x10 ⁻⁸ 63%	4.6x10 ⁻⁶ 89%	20 83%
A2	0.16 12%	6.3x10 ⁻⁴ 11%	2.7x10 ⁻⁵ 8.5%	1.4x10 ⁻⁴ 5.6%	2.9x10 ⁻⁸ 29%	4.8x10 ⁻⁷ 9.4%	2.4 10%
A3	0.13 9.9%	1.9x10 ⁻⁴ 3.2%	1.8x10 ⁻⁵ 5.8%	1.5x10 ⁻⁴ 5.8%	8.0x10 ⁻⁹ 7.9%	1.1x10 ⁻⁷ 2.1%	1.5 6.4%

*This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources

Table 18. CML-IA Life Cycle Impact Assessment (LCIA) results for 1 m² 20 oz. vinyl wallcovering with woven backing. All values are rounded to two significant digits.

Module	GWP (kg CO ₂ eq)	AP (kg SO ₂ eq)	POCP (kg C ₂ H ₄ eq)	EP (kg PO ₄ ³⁻ eq)	ODP (kg CFC-11 eq)	ADPE* (kg Sb eq)	ADPF (MJ)
Total	1.7 100%	7.9x10 ⁻³ 100%	4.2x10 ⁻⁴ 100%	3.5x10 ⁻³ 100%	1.4x10 ⁻⁷ 100%	6.9x10 ⁻⁶ 100%	32 100%
A1	1.3 78%	6.8x10 ⁻³ 87%	3.7x10 ⁻⁴ 86%	3.1x10 ⁻³ 89%	8.6x10 ⁻⁸ 64%	6.1x10 ⁻⁶ 89%	26 84%
A2	0.21 13%	8.4x10 ⁻⁴ 11%	3.6x10 ⁻⁵ 8.5%	1.9x10 ⁻⁴ 5.6%	3.9x10 ⁻⁸ 29%	6.4x10 ⁻⁷ 9.4%	3.2 10%
A3	0.16 9.4%	2.2x10 ⁻⁴ 2.8%	2.3x10 ⁻⁵ 5.3%	1.9x10 ⁻⁴ 5.5%	1.0x10 ⁻⁸ 7.5%	1.2x10 ⁻⁷ 1.8%	1.9 5.9%

*This indicator is based on assumptions regarding current reserves estimates. Users should use caution when interpreting results because there is insufficient information on which indicator is best for assessing the depletion of abiotic resources

Table 19. Resource use results for 1 m² 15 oz. vinyl wallcovering with non-woven backing.

Module	PERE (MJ)	PERM (MJ)	PERT (MJ)	PENRE (MJ)	PENRM (MJ)	PENRT (MJ)	SM (kg)	RSF (MJ)	NRSF (MJ)	FW (m ³)
Total	1.9	0.96	2.9	19	INA	19	5.5x10 ⁻²	INA	INA	0.14
A1	1.9	0.42	2.3	16	INA	16	2.7x10 ⁻²	INA	INA	0.14
A2	3.0x10 ⁻²	0.0	3.0x10 ⁻²	2.3	INA	2.3	0.0	INA	INA	1.5x10 ⁻³
A3	3.3x10 ⁻²	0.55	0.58	0.63	INA	0.63	2.8x10 ⁻²	INA	INA	6.3x10 ⁻³

INA = Indicator Not Assessed

Table 20. Waste and outflow results for 1 m² 15 oz. vinyl wallcovering with non-woven backing.

Module	HWD (kg)	NHWD (kg)	RWD (kg)	CRU (kg)	MFR (kg)	MER (kg)	EEE (MJ)	EET (MJ)
Total	1.7x10 ⁻⁵	0.29	4.4x10 ⁻⁵	0.0	Neg	INA	INA	INA
A1	1.4x10 ⁻⁵	0.10	2.7x10 ⁻⁵	0.0	Neg	INA	INA	INA
A2	1.5x10 ⁻⁶	0.12	1.7x10 ⁻⁵	0.0	0.0	INA	INA	INA
A3	1.7x10 ⁻⁶	7.7x10 ⁻²	8.3x10 ⁻⁷	0.0	0.0	INA	INA	INA

INA = Indicator Not Assessed

Neg = Negligible

Table 21. Resource use results for 1 m² 20 oz. vinyl wallcovering with non-woven backing.

Module	PERE (MJ)	PERM (MJ)	PERT (MJ)	PENRE (MJ)	PENRM (MJ)	PENRT (MJ)	SM (kg)	RSF (MJ)	NRSF (MJ)	FW (m ³)
Total	2.3	1.1	3.4	25	INA	25	6.4x10 ⁻²	INA	INA	0.19
A1	2.2	0.56	2.7	21	INA	21	3.6x10 ⁻²	INA	INA	0.18
A2	4.0x10 ⁻²	0.0	4.0x10 ⁻²	3.1	INA	3.1	0.0	INA	INA	2.0x10 ⁻³
A3	3.4x10 ⁻²	0.55	0.58	0.71	INA	0.71	2.8x10 ⁻²	INA	INA	7.8x10 ⁻³

INA = Indicator Not Assessed

Table 22. Waste and outflow results for 1 m² 20 oz. vinyl wallcovering with non-woven backing.

Module	HWD (kg)	NHWD (kg)	RWD (kg)	CRU (kg)	MFR (kg)	MER (kg)	EEE (MJ)	EET (MJ)
Total	2.3x10 ⁻⁵	0.39	5.8x10 ⁻⁵	0.0	Neg	INA	INA	INA
A1	1.9x10 ⁻⁵	0.13	3.6x10 ⁻⁵	0.0	Neg	INA	INA	INA
A2	2.0x10 ⁻⁶	0.15	2.2x10 ⁻⁵	0.0	0.0	INA	INA	INA
A3	2.2x10 ⁻⁶	0.10	9.0x10 ⁻⁷	0.0	0.0	INA	INA	INA

INA = Indicator Not Assessed

Neg = Negligible

Table 23. Resource use results for 1 m² 15 oz. vinyl wallcovering with woven backing.

Module	PERE (MJ)	PERM (MJ)	PERT (MJ)	PENRE (MJ)	PENRM (MJ)	PENRT (MJ)	SM (kg)	RSF (MJ)	NRSF (MJ)	FW (m ³)
Total	2.9	0.55	3.5	20	INA	20	5.5x10 ⁻²	INA	INA	0.20
A1	2.9	0.00	2.9	17	INA	17	2.7x10 ⁻²	INA	INA	0.19
A2	3.0x10 ⁻²	0.0	3.0x10 ⁻²	2.3	INA	2.3	0.0	INA	INA	1.5x10 ⁻³
A3	3.3x10 ⁻²	0.55	0.58	0.63	INA	0.63	2.8x10 ⁻²	INA	INA	6.3x10 ⁻³

INA = Indicator Not Assessed

Table 24. Waste and outflow results for 1 m² 15 oz. vinyl wallcovering with woven backing.

Module	HWD (kg)	NHWD (kg)	RWD (kg)	CRU (kg)	MFR (kg)	MER (kg)	EEE (MJ)	EET (MJ)
Total	2.1x10 ⁻⁵	0.30	4.6x10 ⁻⁵	0.0	Neg	INA	INA	INA
A1	1.8x10 ⁻⁵	0.11	2.9x10 ⁻⁵	0.0	Neg	INA	INA	INA
A2	1.5x10 ⁻⁶	0.12	1.7x10 ⁻⁵	0.0	0.0	INA	INA	INA
A3	1.7x10 ⁻⁶	7.7x10 ⁻²	8.3x10 ⁻⁷	0.0	0.0	INA	INA	INA

INA = Indicator Not Assessed

Neg = Negligible

Table 25. Resource use results for 1 m² 20 oz. vinyl wallcovering with woven backing.

Module	PERE (MJ)	PERM (MJ)	PERT (MJ)	PENRE (MJ)	PENRM (MJ)	PENRT (MJ)	SM (kg)	RSF (MJ)	NRSF (MJ)	FW (m ³)
Total	3.9	0.55	4.4	26	INA	26	6.4x10 ⁻²	INA	INA	0.26
A1	3.8	0.00	3.8	23	INA	23	3.6x10 ⁻²	INA	INA	0.25
A2	4.0x10 ⁻²	0.0	4.0x10 ⁻²	3.1	INA	3.1	0.0	INA	INA	2.0x10 ⁻³
A3	3.4x10 ⁻²	0.55	0.58	0.71	INA	0.71	2.8x10 ⁻²	INA	INA	7.8x10 ⁻³

INA = Indicator Not Assessed

Table 26. Waste and outflow results for 1 m² 20 oz. vinyl wallcovering with woven backing.

Module	HWD (kg)	NHWD (kg)	RWD (kg)	CRU (kg)	MFR (kg)	MER (kg)	EEE (MJ)	EET (MJ)
Total	2.8x10 ⁻⁵	0.40	6.1x10 ⁻⁵	0.0	Neg	INA	INA	INA
A1	2.4x10 ⁻⁵	0.15	3.8x10 ⁻⁵	0.0	Neg	INA	INA	INA
A2	2.0x10 ⁻⁶	0.15	2.2x10 ⁻⁵	0.0	0.0	INA	INA	INA
A3	2.2x10 ⁻⁶	0.10	9.0x10 ⁻⁷	0.0	0.0	INA	INA	INA

INA = Indicator Not Assessed

Neg = Negligible

6. LCA: Interpretation

The interpretation phase conforms to ISO 14044 with further guidance from the ILCD General Guide for Life Cycle Assessment. The interpretation included the use of evaluation and sensitivity checks to steer the iterative process during the assessment, and a final evaluation including completeness, sensitivity, and consistency checks, at the end of the study.

Generally speaking, the contribution to environmental impacts from raw material extraction and processing (Module A1) is the largest, followed by the transport of material components to the manufacturing facility (Module A2). Ultimately, the contribution to environmental impacts from manufacturing (Module A3) is relatively small compared to the other cradle-to-gate stages.

7. Requisite Evidence

7.1 VOC emissions

The Len-Tex vinyl wallcovering products in this study are SCS Indoor Advantage Gold™ certified (SCS-IAQ-02056), which conforms to the CDPH/EHLB Standard Method (CA 01350) v1.2-2017. The certification is available online:

<https://www.scsglobalservices.com/certified-green-products-guide>

8. Additional Environmental Information

Len-Tex is fully committed to environmental stewardship and continuously improving its processes to reduce our impacts on the earth when manufacturing wallcovering. We believe in a cradle to cradle philosophy in managing our materials and will pursue any opportunity to give materials a new life cycle. The recycling infrastructure at Len-Tex has evolved tremendously over the years and we now divert waste from being landfilled or incinerated.

We recycle all our boxboard and cardboard, white and colored paper, empty cups and food containers, plastics #1-7 including our core protectors, glass bottles and jars, metals, newspapers, junk and unopened mail, and magazines. However, it was our raw material waste and its end-of-life that needed attention and we have focused on this piece of our sustainability story the most. We have created partnerships within our supply chain that allow us to recycle all our fabric or paper backed edge trim. This includes the trimming from the wallcovering when cutting to proper width, our scrap raw vinyl, rejected materials including master rolls, thirty-yard bolts, discontinued products, defective products, and reclaimed product after its useful life has ended via our End-of-Life Return Program. This trash truly becomes someone else's treasure as it is transformed through a proprietary process into a feedstock for other vinyl products not manufactured at Len-Tex.

We also recycle our inks by recapturing water-based inks and coatings after printing. We also use color matching technology to re-use what would have otherwise been disposed of via wastewater treatment. These recycling activities are essential to reducing waste, energy, and their associated emissions.

We have been able to achieve significant reductions in these areas which contributes to a healthier bottom line as well as a healthier planet, which is a critical part of the Len-Tex mission and sustainability story.



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