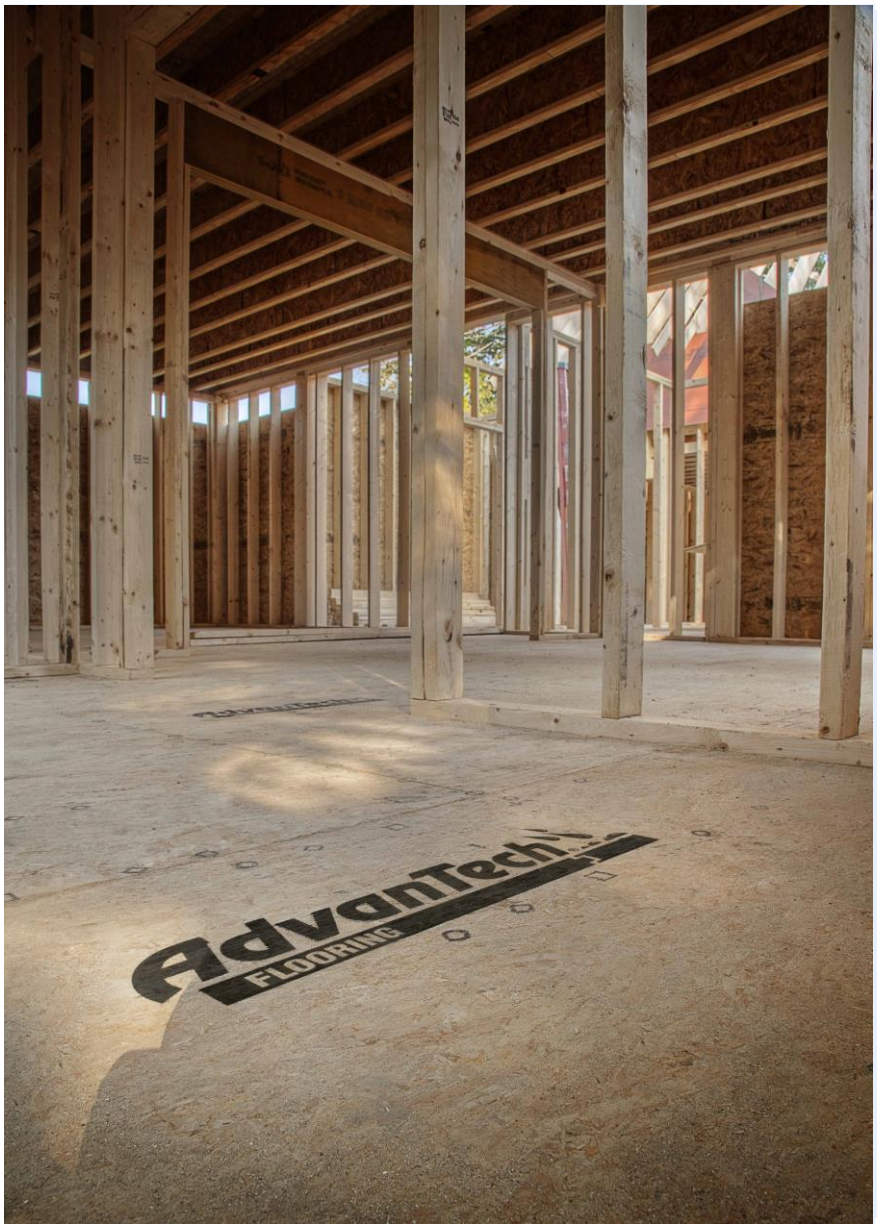
ENVIRONMENTAL PRODUCT DECLARATION

ADVANTECH® FLOORING AND SHEATHING

J.M HUBER CORPORATION



AdvanTech® subflooring is specifically engineered to combine industry-leading strength, superior moisture resistance and installation ease, making it FLAT OUT BEST™ for a quiet, stiff floor

HUBER ENGINEERED WOODS

Huber Engineered Woods LLC continually strives to create innovative products that suit their customers' needs. Each one delivers outstanding performance, easy installation and greater strength in single family, multifamily and light commercial projects. AdvanTech® flooring delivers performance and peace of mind into every floor you build. Voted #1 in quality every year since 2002 by BUILDER Magazine's annual survey of builders, no other subfloor panel matches the award-winning quality and performance of AdvanTech flooring. Specifically engineered to combine industry leading strength, stiffness, fastener holding power, superior moisture resistance and installation ease, AdvanTech flooring is the FLAT OUT BEST™ for a quiet, stiff floor.

www.advantechperforms.com

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

AdvanTech®
Premium Structural Roof, Wall, and Subflooring Products

According to ISO 14025,
EN 15804, and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611	https://www.ul.com/ https://spot.ul.com/
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.4 July 2018	
MANUFACTURER NAME AND ADDRESS	Huber Engineered Woods, 10925 David Taylor Drive, Suite 300 Charlotte, NC 28262	
DECLARATION NUMBER	4789103593.101.1	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1 cubic meter	
REFERENCE PCR AND VERSION NUMBER	Product Category Rules Guidance for Building-Related Products and Services Part B: Structural and Architectural Wood Products EPD Requirements, UL, First Edition, October 21, 2019	
DESCRIPTION OF PRODUCT APPLICATION/USE	Oriented Strand Board Roof and Wall Sheathing	
PRODUCT RSL DESCRIPTION (IF APPL.)	75 years	
MARKETS OF APPLICABILITY	Residential, Multi-Family, Commercial	
DATE OF ISSUE	July 1, 2020	
PERIOD OF VALIDITY	5 Years	
EPD TYPE	Product-Specific	
RANGE OF DATASET VARIABILITY	n/a	
EPD SCOPE	Cradle to gate with options (A4, A5, C2, and C4)	
YEAR(S) OF REPORTED PRIMARY DATA	July 2018 to June 2010	
LCA SOFTWARE & VERSION NUMBER	SimaPro v9	
LCI DATABASE(S) & VERSION NUMBER	ecoinvent v3.5	
LCIA METHODOLOGY & VERSION NUMBER	TRACI	

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

AdvanTech®
Premium Structural Roof, Wall, and Subflooring Products

According to ISO 14025,
EN 15804, and ISO 21930:2017

Product Classification and Description

Product Description

Huber Engineered Wood's AdvanTech® flooring and sheathing is made of combined wood strands and resin arranged in layers with deliberate orientation providing superior strength, stiffness, durability and quality.

Specifically engineered to combine industry-leading strength, superior moisture resistance and installation ease, AdvanTech® flooring is the FLAT OUT BEST™ for a quiet, stiff floor. AdvanTech® subflooring is the subfloor that more builders trust[1]. It's engineered for superior strength, moisture resistance and consistent quality so you can build the quiet, stiff floor your homeowners demand.

Beyond providing superior strength and moisture resistance for your floors, AdvanTech® sheathing is available to bring the same level of quality to your walls and roof. Providing total performance in one panel, AdvanTech sheathing offers industry leading strenghth and stiffness, easy installation, and superior moisture resistance.

1 Delivers on your vision for a durable building
With industry leading strength and stiffness and backed by its lifetime warranty,[1] you can rest assured of the subfloor's structural integrity for the life of the building.

2 Moisture resistance during construction
No more worries about the delays and costs of reworking a swollen, warped or delaminated subfloor. AdvanTech flooring is the ideal substrate for longer exposure times and is backed by its 500-day no sanding guarantee.[1]

3 Built to a higher standard - ESR-1785[3]
Substantiated by third party testing, AdvanTech flooring maintains higher levels of strength, stiffness and fastener holding power than commodity grade OSB and plywood making it the ideal wood structural panel for specification.

4 A sustainable subfloor system
An integral part of sustainable design, contributing points toward green building programs such as LEED, IgCC, NGBS, and CALGreen.

5 Provides peace of mind
Best-in-class warranties add confidence it will perform during construction and help alleviate future concerns post-sale.

LIFETIME

500 DAY NO SANDING GUARANTEE

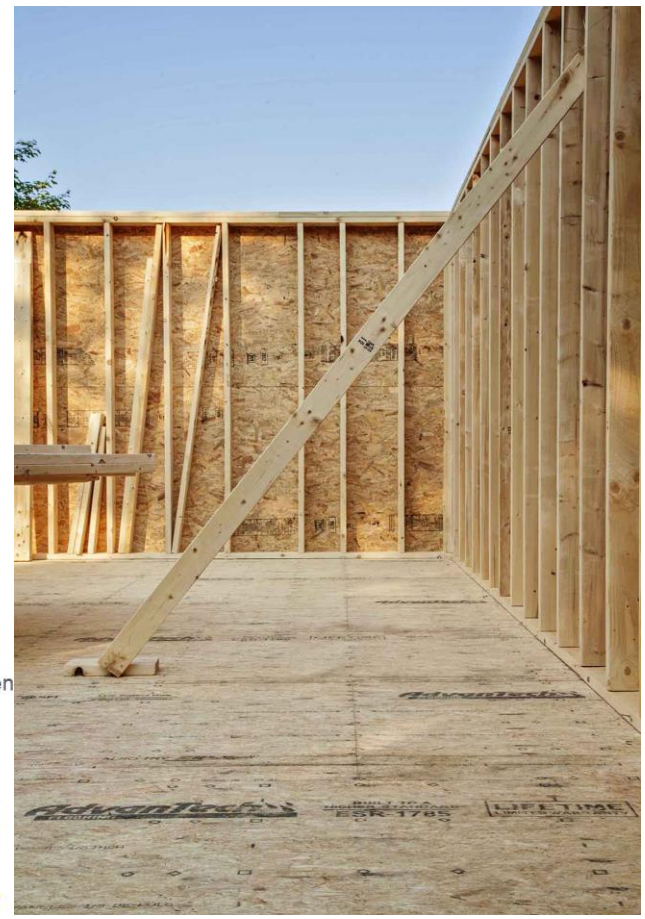


Figure 1: AdvanTech Description and Integration into a Building

[1] Builder Magazine's annual Brand Use Study

[2] ESR-1785 is an Evaluation Services Report (ESR) issued by the International Code Council Evaluation Service. Evaluation reports from ICC Evaluation Service are frequently used by code officials to verify that new and innovative building products comply with code requirements.

Product Styles

This EPD covers two AdvanTech® products: flooring and sheathing. The products are produced in a range of thicknesses, measured in inches, from ½" to 1 1/8". The results presented in the following tables reflect one cubic meter of product. Scaling factors are provided in Table 2 so that the environmental impacts can be multiplied by the scaling factor to obtain the total environmental impacts per square meter for each product.

Table 1: AdvanTech® Declared Unit Properties

Volume	Subflooring	Sheathing
Declared Unit	1 m^3	1 m^3
Mass per Declared Unit (kg)	670	662
Thickness to Achieve Declared Unit (m)	0.0151 m (19/32 in)	0.0127 m (1/2 in)
Density (kg/m^3)	670	662
Moisture Content	3.5%	3.5%
Number of Square Meters to Achieve Declared Unit at Smallest Thickness	66.31	78.74

Table 2: AdvanTech® Scaling Factors

Scaling Factors Obtain 1 Square Meter of Desired Thickness (in/m^2) from Declared Unit	Subflooring	Sheathing	Number of Square Meters for 1m^3 at Specified Thickness
1/2"	-	0.0127	78.74
19/32"	0.0151	-	66.31
5/8"	-	0.0159	62.99
23/32"	0.0183	0.0183	54.78
7/8"	0.0222	-	44.99
1"	0.0254	-	39.37
1 1/8"	0.0286	-	35.00

Range of Application

AdvanTech® products can be used in both flooring and sheathing applications as a wood-structural panel alternate offering industry-leading strength and stiffness[3], moisture resistance, and easy installation.

Product Specification

- Manufacturer-specific Design Capacities for Wood Structural Panels (ICC-ES AC182)
- US Doc PS-2
- CSA 0325

Material Composition

Functional Unit

The functional unit utilized for this study is one cubic meter (1 m^3) with a service life of 60 years, including end-of-life disposition.

Product Material Composition

Wood strands represent the largest AdvanTech® formulation component. Resins used to bind the AdvanTech wood strands are the second largest formulation component. The AdvanTech formulation components are displayed in the following table.

Table 3: AdvanTech® Product Recipes

Product Recipe	AdvanTech Subflooring	AdvanTech Sheathing
Wood	90-95%	90-95%
Core resin	1-6%	1-6%
Surface resin	1-6%	1-6%
Wax	1-4%	1-4%
Release Agent	<0.5%	<0.5%
Ink	<0.1%	<0.1%
Edge Seal	<0.1%	<0.1%

Packaging Material Composition

AdvanTech® panels are stacked on top of each other onto 3 wood strips to enable loading and unloading via fork truck. The stacks are protected with vertical cardboard side covers and banded together with the wood strips with plastic banding.

Table 4: AdvanTech® Packaging Materials (per cubic meter)

Packaging Material	Subflooring	Sheathing
Side Cover (Plastic)	2.36 lbs (1.07 kg)	2.56 lbs (0.98 kg)
Sticker/Batten (Wood)	3.16 lbs (1.43 kg)	2.89 lbs (1.31 kg)
Plastic Strapping	0.22 lbs (0.1 kg)	0.20 lbs (0.09 kg)

Technical Requirements

The standards that can be applied for Advantech products are as follows:

- Manufacturer-specific Design Capacities for Wood Structural Panels (ICC-ES AC182)
- ASTM D3498 Standard Specification for Field-Gluing Plywood to Lumber Framing for Floor Systems

Properties of Declared Product as Delivered

The product is delivered in the following status:

	Subflooring	Sheathing
Length	8 ft (2.4 m)	8 ft (2.4 m)
Width	4 ft (1.2 m)	4 ft (1.2 m)
Height	2.7 ft – 3 ft (0.82 – 0.91 m)	2.7 ft – 3 ft (0.82 – 0.91 m)
Total Weight	3,500 – 3,850 lbs (1,580 kg – 1,740 kg)	3,500 – 3,800 lbs (1,580 kg – 1,720 kg)
Panels Per Unit	55 panels (19/32” thickness) 45 panels (23/32” thickness) 40 panels (7/8” thickness) 35 panels (1” thickness) 30 panels (1 1/8” thickness	70 panels (1/2” thickness) 55 panels (5/8” thickness) 45 panels (23/32” thickness)

Life Cycle Stages

EPD Scope

The life cycle analysis performed for this EPD is characterized as a “cradle-to-gate with options” study, examining the AdvanTech® products from raw material extraction through final disposal excluding the use phase.

Table 5: AdvanTech® System Boundary

Product Stage			Construction Process Stage		Use Stage							End of Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	MND

Time Boundary / Period Under Review

Data for this LCA was collected from July 2018 through June 2019.

Cut-off Criteria

Processes with a cumulative mass or energy of the system flows/model less than 1% may be excluded, provided its environmental relevance is minor. Processes that meet that criteria but contribute at least 2% to the selected impact categories shall be included in the system boundary. In no case shall less than 95% of mass or environmental impact be included in the system boundary.

All hazardous or toxic substances shall be included in the system boundary.

This LCA is in compliance with the cut-off criteria since no known processes were neglected or excluded from this analysis except an accelerant in the resin. The accelerant is used only at one of the four manufacturing facilities, comprising an average of 0.08% of the total input material. No composition information was available from the supplier.

Data Sources

Primary data were collected directly from the facilities for ever yproces in the product system under the control of J.M. Huber Corporation. SimaPro v9 software was utilized for modeling the complete cradle-to-gate with options inventory. The ecoinvent v3.5 life cycle inventory database was the primary sources of secondary data utilized for this study. Supplemental secondary data was used from the US LCI database.

System Boundaries

This project considers the life cycle activities from resource extraction through product installation, as well as end of life (i.e. cradle-to-gate with options) for a 75 year service life.

Allocation

Allocation of multi-output processes was performed following the requirements and guidance of ISO 14044:2006, clause 4.3.4, and was based on mass. Any co-products were less than 10x the economic value of the main products and were not included in the allocation.

Treatment of Biogenic Carbon

Biogenic carbon was considered neutral throughout this study. Separate carbon uptake and emissions from bio-derived sources are reported separately in the “Output Flows and Waste Categories” for both product and packaging biogenic carbon.

Data Quality

For consistency in the model, specific, primary data from the manufacturing process was provided by the relevant facilities. Upstream and downstream raw materials and other data were modeled using secondary data obtained from relevant databases as documented in the LCA Report. Thse databases are from nationally accepted and publicly available databases, ensuring reproducibility. This study is representative only of Huber AdvanTech® flooring and sheathing.

Estimates and Key Assumptions

For installation, packaging waste was modeled as landfilled. Any required energy of this product to be installed into building was considered below the cut-off criteria and excluded.

Production of AdvanTech Products

Production Process

The incoming logs are delivered by truck to the scale house. The logs are stripped of bark and fed into a strander which slices the material into small pieces (strands). The strands then enter a drying process and are dried down to a low moisture content. The strands are then sent through a cyclone where they are separated from the dryer airstream and into a screening process where any unusable strands are removed. These newly screened strands are sent to dry bins for storage. From there, the strands are blended with resins, waxes, and other binders to hold them together. A forming machine lays down the strands into a mat on a forming belt. During this forming process, the strands are oriented in alternating directions as they are conveyed, resulting in a more structurally consistent panel. The mats are trimmed into the desired lengths, and heat and pressure are applied to activate the resin and bond the strands into a solid panel. The panel edges are trimmed and cut to length and width. Panels are sanded, labeled and edge coated. Finished panels are stacked, packaged, and shipped to customers.

AdvanTech® products are produced at plants in Commerce, Georgia; Broken Bow, Oklahoma; Crystal Hill, Virginia; Spring City, TN; and Easton, Maine. Detailed operational and production data was collected from each facility and combined into a weighted average in collaboration with process experts.

Construction

Transportation and Delivery

Final products were modeled as being shipped by truck and rail. Records of customer sales were used to generate the average distances.

Table 6: Transport to the Building Site (A4)

Name	Subflooring	Sheathing	Unit
Fuel Type	Diesel	Diesel	
Liters of fuel	38	38	l/100km
Vehicle type	3% by rail 97% by truck	3% by rail 97% by truck	
Average Transport Distance	617	607	km
Capacity Utilization	90	90	% by mass
Weight of products transported	670	662	kg
Volume of products transported	1	1	m^3
Capacity utilization volume factor	1	1	

Installation

Huber products are designed for superior durability and installation ease. For installation, nails or screws are required for fastening; this is a similar requirement to other types of OSB or plywood. 13 nails per square meter and the electricity from an air compressor for a nail gun were included in the installation of these products for this study.The quantity is a similar requirement to other types of OSB or plywood. Subfloor adhesive was also included. 5% installation scrap is also assumed to be generated from the installation of the product.

Table 7: Installation into the Building (A5)

Name	Subflooring	Sheathing	Unit
Ancillary materials	Adhesive: 0.9 kg Nails: 1.7 kg	Adhesive: 1.0 kg Nails: 2.0 kg	kg
Net freshwater consumption specified by water source and fate	n/a	n/a	m^3
Other resources type	n/a	n/a	Kg
Electricity consumption	<0.01	<0.01	kWh
Other energy carriers	n/a	n/a	MJ
Product loss per functional unit	33.5	33.1	kg
Waste materials at the construction site	36.1	35.4	kg
Output materials (landfill)	36.1	35.4	kg
Mass of packaging waste specified by type	2.5 (wood) 0.10 (plastic)	2.3 (wood) 0.09 (palstic)	kg
Biogenic carbon contained in packaging	0.73	0.67	kg CO_2
Direct emissions to ambient air, soil and water	n/a	n/a	kg
VOC emissions	unk	unk	µg/m^3

Waste

During installation, saw dust, wood scrap, and packaging waste are generated. A 5% product scrap rate was assumed based on product installation expertise.

Use Stage

Product Service Life

AdvanTech flooring and sheathing products are weather and moisture resistant and can withstand a long duration when exposed to the elements during the construction process. Once properly installed in a finished code complying building, this study assumes that these products can last the duration of an average building, that is, at least 75 years.

Table 8: Reference Service Life

Name	Subflooring	Sheathing	Unit
Reference Service Life (RSL)	75	75	years
Declared Product Properties	Please refer to the installation guide for further information regarding installation practices. https://www.huberwood.com/uploads/documents/technical/literature/AdvanTech-InstallationGuide-2013-10-1.pdf		
Design Application Parameters			
Quality of Work			
Outdoor Environment	AdvanTech panels should not be used in applications that will expose the panels to weather permanently. AdvanTech panels are not approved or certified for exterior exposure. Classified as Exposure 1 under PS-2, AdvanTech panels are intended to resist the effects of moisture due to construction delays or other conditions of similar severity, but are not suitable for permanent exposure.		
Indoor Environment	Please visit huberwood.com for more information.		
Use conditions	Please visit huberwood.com for more information.		
Estimated Building Life	75	75	years
Number of Replacements	0	0	number
Maintenance	n/a	n/a	n/a

Use Stage Assumptions

During the use stage, the product is contained within the exterior structure of the building. AdvanTech products use no energy or water during the use stage. AdvanTech flooring and sheathing require no maintenance, repair, replacement, or refurbishment during their service life.

End of Life

Disposal

The end-of-life scenario was modeled based on the 2017 US EPA solid waste and waste diversion statistics. The study assumes a 14.8% recycling rate with the remaining 85.2% being disposed as the average US municipal solid waste disposition. The average US disposition includes 81% landfill and 19% incineration. The cut-off methodology (also known as the recycled content method in the GHG Protocol for Products) was used for any materials that were sent to recycling such as scrap and the end of life disposition.

Table 9: End of Life (C1-C4)

Name		Subflooring	Sheathing	Unit
Assumptions for scenario development		Products are manually removed and disposed with construction and demolition (C&D) waste, and may be sorted and recycled, landfilled or incinerated..		
Collection process	Collected separately	n/a	n/a	kg
	Collected with mixed construction waste	670	662	kg
Recovery and Disposal	Reuse	0	0	kg
	Recycling	102	101	kg
	Landfill	460	454	kg
	Incineration	108	107	kg
	Incineration (with energy recovery)	0	0	kg
	Energy conversion	n/a	n/a	
Removals of biogenic carbon (excluding packaging)		310	310	kg

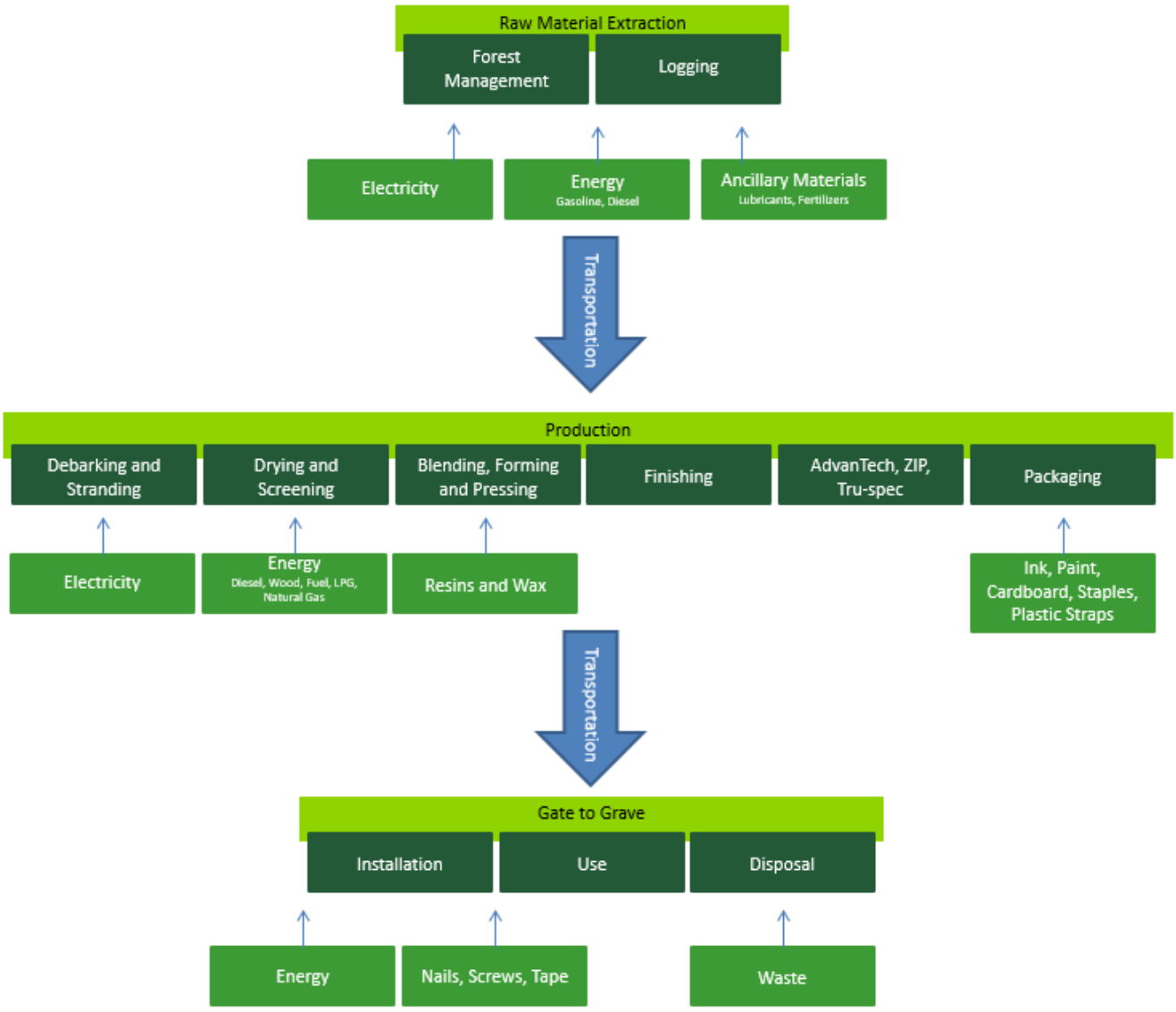


Figure 2: System Flow Diagram

Potential Environmental Impacts

AdvanTech Subflooring

The tables below present the six selected categories of potential environmental impacts (global warming, acidification, eutrophication, smog creation, ozone depletion, and fossil fuel depeltion) generated for each cradle-to-gate with options life cycle stage for 1 cubic meter AdvanTech® subflooring. Refer to the scaling factors above to convert these results to the appropriate product thicknesses.

Table 10: Life Cycle Impact Assessment of 1m^3 AdvanTech Subflooring

TRACI 2.1 Impact Assessment							
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.7E+02	3.7E+01	7.7E+01	6.4E+00	5.0E+01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	6.4E-07	1.4E-09	1.9E-06	2.7E-10	1.5E-06
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	4.8E+00	2.3E-01	3.2E-01	8.5E-02	1.2E-01
EP	Eutrophication potential	kg N-Eq.	3.1E-01	1.3E-02	2.4E-01	5.1E-03	2.5E+00
SP	Smog formation potential	kg O_3-Eq.	5.2E+01	6.5E+00	2.5E+00	2.2E+00	3.5E+00
FFD	Fossil Fuel Depletion	MJ-surplus	2.0E+03	7.0E+01	2.9E+02	1.4E+01	1.8E+01
CML 3.05 Impact Assessment							
Parameter	**Parameter**		**A1-A3**	**A4**	**A5**	**C2**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.8E+02	3.7E+01	7.9E+01	6.4E+00	5.2E+01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	5.1E-07	1.4E-09	1.6E-06	2.7E-10	1.2E-06
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	4.9E+00	1.9E-01	3.4E-01	6.5E-02	8.9E-02
EP	Eutrophication potential	kg $(PO_4)^3$-Eq.	3.5E-01	3.4E-02	1.1E-01	1.4E-02	9.8E-01
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	3.1E-01	8.3E-03	2.3E-02	-1.4E-02	5.2E-03
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	7.6E-05	0.0E+00	1.7E-04	0.0E+00	1.3E-05
ADPF	Abiotic depletion potential for fossil resources	MJ	1.4E+04	4.7E+02	2.0E+03	9.2E+01	1.3E+02

Table 11: Use of Resources of 1m³ AdvanTech Subflooring

Resource Use							
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
PERE	Renewable primary energy as energy carrier	MJ	1.4E+04	0.0E+00	1.4E+01	0.0E+00	2.1E+00
PERM	Renewable primary energy resources as material utilization	MJ	1.6E+01	0.0E+00	4.9E+00	0.0E+00	6.4E-01
PENRE	Nonrenewable primary energy as energy carrier	MJ	1.4E+04	5.0E+02	2.1E+03	9.8E+01	1.4E+02
PENRM	Nonrenewable primary energy as material utilization	MJ	1.2E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SM	Use of secondary material	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RE	Use of recovered energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	m^3	1.3E+01	0.0E+00	1.3E-01	0.0E+00	-5.3E-02

Table 12: Output Flows and Waste Categories of 1m³ AdvanTech Subflooring

Output Flows and Waste Categories							
Parameter	**Parameter**	**Units**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
HWD	Hazardous waste disposed	kg	1.4E-04	0.0E+00	6.0E-04	0.0E+00	2.2E-04
NHWD	Non-hazardous waste disposed	kg	1.8E+00	0.0E+00	2.8E+01	0.0E+00	5.7E+02
HLRW	High-level radioactive waste, conditioned, to final repository	kg	1.8E-04	0.0E+00	4.6E-04	0.0E+00	4.7E-04
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CRU	Components for re-use	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MFR	Materials for recycling	kg	5.6E+00	0.0E+00	5.2E+00	0.0E+00	1.0E+02
MER	Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported electrical energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ETE	Exported thermal energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Removals associated with biogenic carbon content of the bio-based product;		kg CO_2	-3.3E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Emissions associated with biogenic carbon content of the bio-based product;		kg CO_2	0.0E+00	0.0E+00	1.6E+01	0.0E+00	3.1E+02
Emissions from calcination and removals from carbonation;		kg CO_2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Removals and emissions associated with biogenic carbon content of the bio-based packaging		kg CO_2	-7.3E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Emissions associated with biogenic carbon content of the bio-based packaging		kg CO_2	0.0E+00	0.0E+00	7.3E-01	0.0E+00	0.0E+00
Emissions from combustion of waste from renewable sources used in production processes;		kg CO_2	3.3E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Emissions from combustion of waste from non-renewable sources used in production processes.		kg CO_2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

AdvanTech Sheathing

The tables below present the five selected categories of potential environmental impacts (global warming, acidification, eutrophication, smog creation, and ozone depletion) generated for each cradle-to-gate with options life cycle stage for 1 cubic meter AdvanTech® sheathing. Refer to the scaling factors above to convert these results to the appropriate product thicknesses.

Table 13: Life Cycle Impact Assessment of 1m³ AdvanTech® Sheathing

TRACI 2.1 Impact Assessment							
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	7.8E+03	3.8E+01	7.9E+01	6.3E+00	4.9E+01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.3E-05	1.4E-09	2.0E-06	2.7E-10	1.5E-06
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	8.2E+01	2.3E-01	3.3E-01	8.4E-02	1.2E-01
EP	Eutrophication potential	kg N-Eq.	7.6E+00	1.3E-02	5.5E-01	5.0E-03	2.5E+00
SP	Smog formation potential	kg O_3-Eq.	1.0E+03	6.3E+00	2.6E+00	2.2E+00	3.6E+00
FFD	Fossil Fuel Depletion	MJ-surplus	3.5E+04	7.2E+01	2.8E+02	1.3E+01	1.8E+01
CML 3.05 Impact Assessment							
Parameter	**Parameter**		**A1-A3**	**A4**	**A5**	**C2**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	7.9E+03	3.8E+01	8.2E+01	6.4E+00	5.1E+01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	9.9E-06	1.4E-09	1.7E-06	2.6E-10	1.2E-06
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	8.3E+01	1.9E-01	3.4E-01	6.4E-02	9.1E-02
EP	Eutrophication potential	kg $(PO_4)^3$-Eq.	7.5E+00	3.4E-02	2.2E-01	1.4E-02	9.7E-01
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	5.4E+00	8.6E-03	2.4E-02	-1.3E-02	5.3E-03
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.1E-03	0.0E+00	1.9E-04	0.0E+00	1.3E-05
ADPF	Abiotic depletion potential for fossil resources	MJ	2.4E+05	4.8E+02	2.0E+03	9.1E+01	1.3E+02

Table 14: Use of Resources of 1m³ AdvanTech® Sheathing

Resource Use							
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
PERE	Renewable primary energy as energy carrier	MJ	2.5E+05	0.0E+00	1.5E+01	0.0E+00	2.2E+00
PERM	Renewable primary energy resources as material utilization	MJ	5.0E+02	0.0E+00	5.1E+00	0.0E+00	6.5E-01
PENRE	Nonrenewable primary energy as energy carrier	MJ	2.4E+05	5.1E+02	2.1E+03	9.6E+01	1.5E+02
PENRM	Nonrenewable primary energy as material utilization	MJ	1.7E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SM	Use of secondary material	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RE	Use of recovered energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	m^3	2.4E+02	0.0E+00	1.3E-01	0.0E+00	-6.0E-02

Table 15: Output Flows and Waste Categories of 1m³ AdvanTech® Sheathing

Output Flows and Waste Categories							
Parameter	**Parameter**	**Units**	**A1-A3**	**A4**	**A5**	**C2**	**C4**
HWD	Hazardous waste disposed	kg	2.4E-03	0.0E+00	6.8E-04	0.0E+00	2.3E-04
NHWD	Non-hazardous waste disposed	kg	1.1E+01	0.0E+00	2.8E+01	0.0E+00	5.6E+02
HLRW	High-level radioactive waste, conditioned, to final repository	kg	4.0E-03	0.0E+00	5.4E-04	0.0E+00	4.8E-04
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CRU	Components for re-use	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MFR	Materials for recycling	kg	2.7E-02	0.0E+00	5.1E+00	0.0E+00	1.0E+02
MER	Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported electrical energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ETE	Exported thermal energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Removals associated with biogenic carbon content of the bio-based product;		kg CO_2	-3.3E+02	0.0E+00	0.0E+00	1.6E+01	0.0E+00
Emissions associated with biogenic carbon content of the bio-based product;		kg CO_2	0.0E+00	0.0E+00	1.6E+01	1.6E+01	3.1E+02
Emissions from calcination and removals from carbonation;		kg CO_2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Removals associated with biogenic carbon content of the bio-based packaging		kg CO_2	-6.7E-01	-6.7E-01	0.0E+00	0.0E+00	0.0E+00
Emissions associated with biogenic carbon content of the bio-based packaging		kg CO_2	0.0E+00	0.0E+00	6.7E-01	0.0E+00	0.0E+00
Emissions from combustion of waste from renewable sources used in production processes;		kg CO_2	3.3E+01	3.2E+01	0.0E+00	0.0E+00	0.0E+00
Emissions from combustion of waste from non-renewable sources used in production processes.		kg CO_2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Interpretation

The product stage is the main driver of results for AdvanTech flooring and sheathing products.Installation and disposal are second and third primary drivers of the life cycle potential environmental impacts.

Please note: while this EPD does not address landscape level forest management impacts, potential impacts may be addressed through requirements put forth in regional regulatory frameworks, ASTM 7612-15 guidance, and ISO 21930 Section 7.2.11 including notes therein. These documents, combined with this EPD, may provide a more complete picture of environmental and social performance of wood products. While this EPD does not address all forest management activities that influence forest carbon, wildlife habitat, endangered species, and soil and water quality, these potential impacts may be addressed through other mechanisms such as regulatory frameworks and/or forest certification systems which, combined with this EPD, will give a more complete picture of environmental and social performance of wood products. EPDs can complement but cannot replace tools and certifications that are designed to address environmental impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, etc. National or regional life cycle averaged data for raw material extraction does not distinguish between extraction practices at specific sites and can greatly affect the resulting impacts.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact when averaging data. Variability was estimated in this EPD by facility weighted averages over a year of data.

Additional Environmental Information

Environment and Health During Manufacture

Huber developed and implemented a Global Environmental, Health and Safety Management System between 2005 and 2007. The system is titled Huber Sustainability Management System (HSMS). A combined regulatory compliance and management system conformance audit program was implemented in 2008. All Huber sites are audited on a recurring schedule, and action plans are created to address audit findings to ensure continual improvement, providing results equivalent to, or surpassing, ISO standards.

Environment and Health During Installation

For sanding, sawing or machining of wood products, avoid creating dust, which can be a source of fire and explosion. Avoid breathing dust. Wood dusts should be wet down to reduce the likelihood of ignition or dispersion of dust in the air. Use NIOSH/OSHA approved respirator where ventilation is not possible and exposure limits could be exceeded. Refer to the AdvanTech Subflooring and Sheathing SDS for further information.

Extraordinary Effects

Fire
AdvanTech flooring and sheathing panels are recognized as having a Class C (III) flame spread rating without need for test or label by HUD/ FHA Manual of Acceptance Practices, Section 405-8 to the Minimum Property Standards.

Water

Based on 24-hour edge swelling demonstrations and 3-hour wicking demonstrations, Advantech sheathing and flooring products have advanced moisture-resistant resins that seal every strand of wood for outstanding water resistance and panels that won't sweel, delaminate or cup. These products also exceed ASTM D3498 standards for dry, wet, frozen and gap-filling adhesion tests.

Mechanical Destruction

There are no relevant data regarding mechanical destruction effects for this product.

Environmental Activities and Certifications

The following certificates are relevant certifications for AdvanTech products.

- Sustainable Forestry Initiative (SFI 2015-2019), SFIS-4Z968-FS4
- Performance Standard for Wood-Based Structural Use Panels (US DOC PS 2-10, CSA 0325-07)
- Product Evaluation Reports ICC-ES ESR-1785

Further Information

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For more information, please visit: http://www.advantechperforms.com

References

- AdvanTech, ZIP System, and Tru-spec Life Cycle Assessment, Sustainable Solutions Corporation, December 2019
- Product Category Rules Guidance for Building-Related Products and Services Part B: Structural and Architectural Wood Products EPD Requirements, UL Environment, First Edition, October 21, 2019
- Product Category Rules: Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment, December 2018, version 3.2
- UL Environment General Program Rules Version 2.0, April 2018
- EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.
- ISO 14025 Environmental labels and declarations - Type III environmental declarations
- ISO 14040 Environmental management - Life cycle assessment – Principles and framework
- ISO 14044 Environmental management - Life cycle assessment – Requirements and guidelines
- ISO 21930 (2017) Sustainability in building construction – Environmental declaration of building products
- ICC-ES AC182 – Acceptance Criteria for Wood Structural Panels
- Sustainable Forestry Initiative 2014-2019 Standard
- Department of Commerce Voluntary Product Standards – Performance Standard for Wood-Based Structural-Use Panels
- EPA, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)
- SimaPro v9 Software
- Ecoinvent v3 Database for Life Cycle Engineering
- ASTM D3498 Standard Specification for Field-Gluing Plywood to Lumber Framing for Floor Systems

LCA Development

This EPD and corresponding LCA were prepared by Sustainable Solutions Corporation of Royersford, Pennsylvania.