Environmental Product Declaration

AdvanTech® Flooring & Sheathing

PRECISION ENGINEERED

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

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UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

AdvanTech
Premium Structural Roof, Wall and Flooring System

According to ISO 14025 and ISO 21930

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. 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, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Huber Engineered Woods
DECLARATION NUMBER	4786451831.101.1
DECLARED PRODUCT	AdvanTech® Flooring & Sheathing
REFERENCE PCR	North American Structural and Architectural Wood Products. UN CPC 31. NAICS 321. May 1, 2013. V1.1
DATE OF ISSUE	October 16, 2014
PERIOD OF VALIDITY	5 years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications

The PCR review was conducted by:	Reviewed by panel
	Wayne B. Trusty (Panel Chair)
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	
	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Brad McAllister, WAP Sustainability

Product Classification and Description

Product Description

Huber Engineered Woods 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. With an industry-leading warranty and unmatched 500-day no-sanding guarantee[1], AdvanTech® flooring is the subfloor that more builders trust[2]. 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 LIMITED WARRANTY

500 DAY NO SANDING GUARANTEE

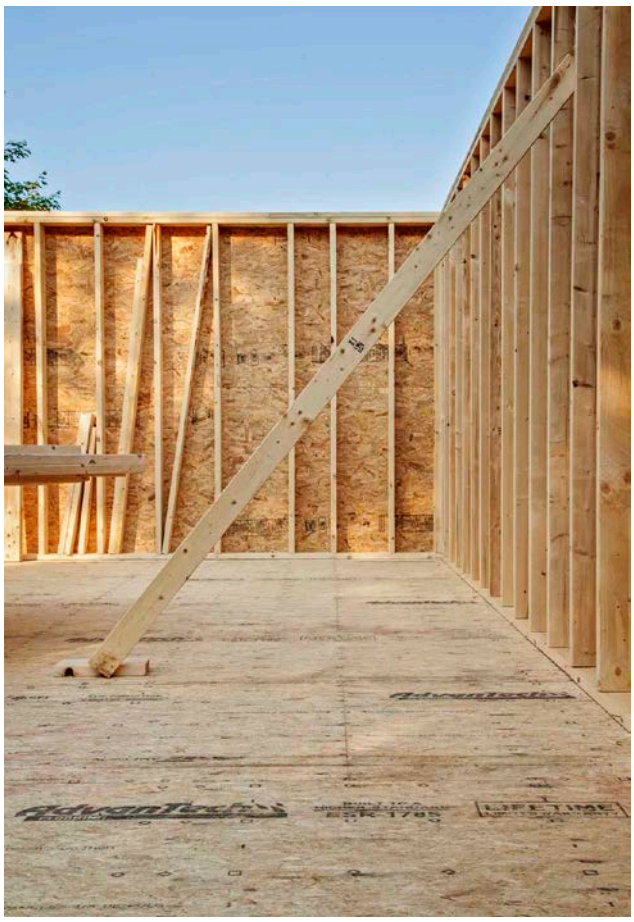

Figure 1: AdvanTech Description and Integration into a Building

[1] Limitations and restrictions apply. Visit www.advantechperforms.com

[2] Builder Magazine's annual Brand Use Study

[3] 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.

Environment

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 the minimum thickness produced for each product. Scaling factors are provided in Table 1 per product for thicker panels. The environmental impacts can be multiplied by the scaling factor to obtain the total environmental impacts per square meter for each product.

Volume	Flooring	Sheathing
1 m^3	66.31	78.74
Thickness (in)	**Flooring**	**Sheathing**
1/2"	-	1.0
19/32"	1.0	-
5/8"	-	1.25
23/32"	1.2105	1.4375
7/8"	1.4737	-
1"	1.6842	-
1 1/8"	1.8947	-

Table 1: AdvanTech Scaling Factors

Range of Application

AdvanTech flooring and sheathing 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 Standard

- Manufacturer-specific Design Capacities for Wood Structural Panels (ICC-ES AC182)

Accreditation

- Sustainable Forestry Initiative (SFI 2010-2014), NSF-SFIS-4Z968
- Performance Standard for Wood-Based Structural Use Panels (US DOC PS 2-10, CSA 0325-07)
- Product Evaluation Reports ICC-ES ESR-1785

Product Composition

Functional Unit

The functional unit utilized for this study is one square meter (1 m^2) with a service life of 60 years, including end-of-life disposition.

Product Content

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.

Product Recipe	AdvanTech Flooring	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%

Table 2: AdvanTech Product Recipes

Packaging Content

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.

Packaging Material	Flooring Mass (lbs)	Sheathing Mass (lbs)
Wood Pallets	1.9E-02	-
Plastic Wrap	5.7E-03	-
Wood Strips	2.1E-02	1.1E-02
Cardboard	3.6E-02	3.6E-02
Plastic Banding	2.5E-03	2.8E-03
Plastic Bags	1.8E-04	9.4E-05
Label	9.5E-03	3.3E-02
Paper	1.0E-04	3.6E-04

Table 3: AdvanTech Packaging Materials (lbs/square meter)

Life Cycle Stages

EPD Scope

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

Time Boundary

Data for this LCA was collected for the 2013 calendar year.

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.

Background Data

SimaPro v8.0.3 software was utilized for modeling the complete cradle-to-grave inventory.

System Boundaries

This project considers the life cycle activities from resource extraction through product use for a 60 year service life. Figure 2 illustrates the system boundary.

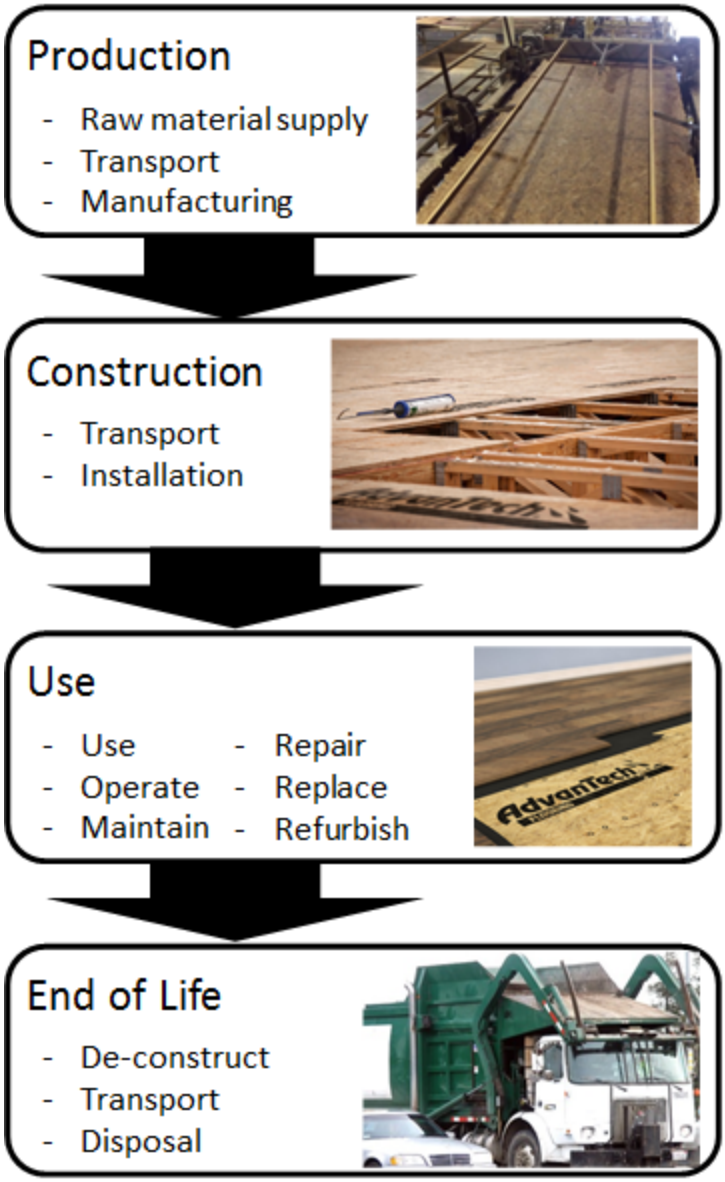

Figure 2: EPD Scope

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.

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.

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 fines are removed. These newly screened flakes 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 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. 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; 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

Delivery

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

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 (0.0257 kg) 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 (0.013 kg) was also included.

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 60 years.

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 reburbishment during their service life.

End of Life

Disposal

The end-of-life scenario was modeled based on the 2011 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 82% landfill and 18% 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.

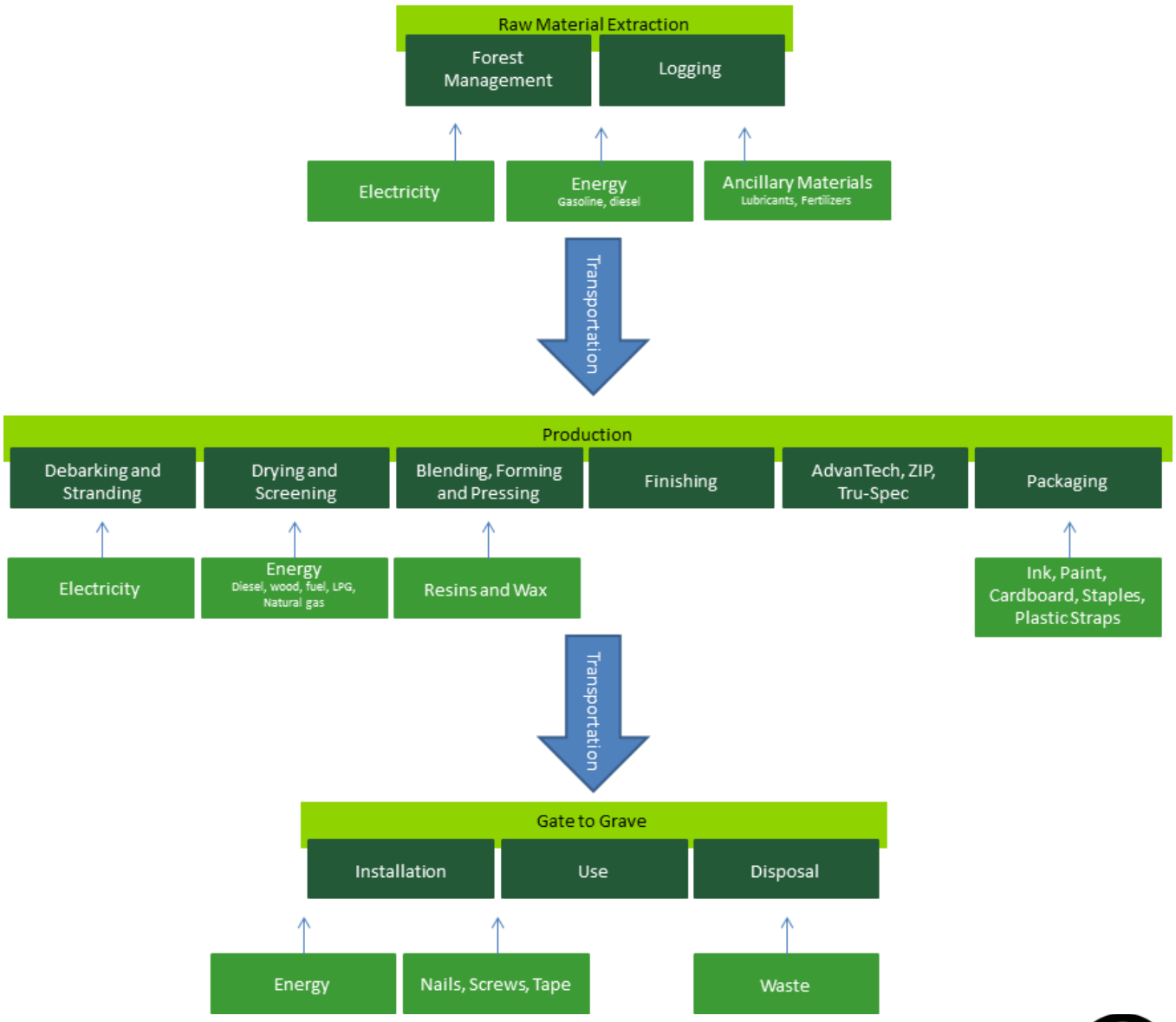

Figure 3: System Flow Diagram

Potential Environmental Impacts

Cradle-to-Grave Potential Environmental Impacts

The tables below present the five selected categories of potential environmental impacts (global warming, acidification, eutrophication, smog creation, and ozone depletion) as well as primary energy consumption, material resources consumption, and waste generated for each cradle-to-grave life cycle stage for 1 square meter AdvanTech® flooring and sheathing. Refer to the scaling factors above to convert these results to other product thicknesses.

Impact Category	Unit (per sq.meter)	Production	Construction	Use	End of Life	Total
Global warming	kg CO_2 eq	6.6E+00	6.7E-01	0	8.8E-01	8.1E+00
Acidification	kg SO_2 eq	7.1E-02	3.9E-03	0	2.3E-03	7.7E-02
Eutrophication	kg N eq	4.4E-03	4.9E-03	0	4.8E-02	5.7E-02
Smog	kg O_3 eq	8.2E-01	1.0E-01	0	6.4E-02	9.8E-01
Ozone Depletion	kg CFC-11 eq	8.9E-08	4.6E-09	0	3.2E-08	1.3E-07
Total primary energy consumption						
Non-renewable fossil	MJ	2.1E+02	8.8E+00	0	4.8E+00	2.3E+02
Non-renewable nuclear	MJ	7.8E-01	9.4E-02	0	1.3E-01	1.0E+00
Renewable (solar, wind, hydro, and geothermal)	MJ	1.3E-01	3.1E-02	0	1.6E-02	1.8E-01
Renewable (biomass)	MJ	1.1E+02	9.6E-03	0	7.7E-03	1.1E+02
Material resources consumption						
Non-renewable materials	kg	7.3E+01	3.3E-01	0	1.2E-01	7.3E+01
Renewable materials	kg	1.7E+01	0	0	0	1.7E+01
Fresh water	l	4.6E+01	1.1E+00	0	1.5E+00	4.8E+01
Waste						
Non-Hazardous waste generated	kg	4.24E-01	5.16E-01	0	1.69E+01	1.8E+01
Hazardous waste generated	kg	3.7E-07	0	0	0	3.7E-07

Table 4: Environmental Impacts using the TRACI 2.1 Methodology of AdvanTech Flooring

Impact Category	Unit (per sq.meter)	Production	Construction	Use	End of Life	Total
Global warming	kg CO_2 eq	4.8E+00	7.2E-01	0	7.2E-01	6.2E+00
Acidification	kg SO_2 eq	5.5E-02	5.7E-03	0	1.9E-03	6.3E-02
Eutrophication	kg N eq	6.0E-03	4.2E-03	0	3.9E-02	5.0E-02
Smog	kg O_3 eq	7.2E-01	1.6E-01	0	5.3E-02	9.4E-01
Ozone Depletion	kg CFC-11 eq	7.7E-08	4.4E-09	0	2.6E-08	1.1E-07
Total primary energy consumption						
Non-renewable fossil	MJ	1.6E+02	9.5E+00	0	3.9E+00	1.8E+02
Non-renewable nuclear	MJ	7.0E-01	9.3E-02	0	1.0E-01	8.9E-01
Renewable (solar, wind, hydro, and geothermal)	MJ	2.7E-01	3.1E-02	0	1.3E-02	3.2E-01
Renewable (biomass)	MJ	9.2E+01	9.6E-03	0	6.3E-03	9.2E+01
Material resources consumption						
Non-renewable materials	kg	6.4E+01	3.3E-01	0	1.0E-01	6.4E-01
Renewable materials	kg	1.3E+01	0	0	0	1.3E+01
Fresh water	l	3.8E+01	1.1E+00	0	1.2E+00	4.1E+01
Waste						
Non-Hazardous waste generated	kg	9.1E-01	4.3E-01	0	1.4E+01	1.5E+01
Hazardous waste generated	kg	1.3E-06	0	0	0	1.3E-06

Table 5: Environmental Impacts using the TRACI Methodology of AdvanTech Sheathing

References

- AdvanTech, ZIP System, and Tru-spec Life Cycle Assessment, Sustainable Solutions Corporation, August 2014
- Product Category Rules for North American Structural and Architectural Wood Products, FPInnovations, version 1.1, May 2013
- 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 Sustainability in building construction – Environmental declaration of building products
- ICC-ES AC182 – Acceptance Criteria for Wood Structural Panels
- Sustainable Forestry Initiative 2010-2014 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 v8.0.3 Software
- Ecoinvent v2.2 Database for Life Cycle Engineering

LCA Development

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

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