ADVANCED FIBER TECHNOLOGY

AFT Carbon Smart™ Loose-Fill Cellulose Insulation

Cellulose insulation is a natural thermal/acoustical insulation material produced from recovered paper fibers in highly efficient electrically driven mills. Recycled newsprint and cardboard are the principal ingredients, but other paper fibers can be, and often are, used.

Due to its inherent recovered content and high thermal efficiency, cellulose insulation is often called 'The Greenest of the Green.'

AFT Carbon Smart™ Insulation LCIA results shows a 16% reduction in global warming potential impacts and an overall 18% environmental performance improvement compared to the industry average.

This product-specific EPD compares results to the CIMA-CIMAC industry-wide Type III EPD, a product group benchmark done in conformance with benchmarking guidance in the UL PCR and the SM Part B: Benchmarking Addendum.

Performance dashboard

Features & functionality

An insulation upgrade in the walls, ceilings, and attics of new homes.

A preferred material for installation in walls and attics of existing homes.

Totally fills building assembly cavities, creating a tight, energy-efficient building envelope.

Creates more fire-resistant walls and attics.

A time-proven product with nearly a century of demonstrated durability and thermal performance.

Sequesters carbon for the life of the building – and beyond.

Visit AFT for more product information

Environment & materials

Improved by:
85%, or more, recovered content – most of it post-consumer

Much material used in cellulose insulation is locally sourced 150 mi from manufacturing plant recovered paper and cardboard

Low or zero VOC emissions

Certifications, rating systems & disclosures:
ASTM Standard C739

ASTM Standard E84

Consumer Products Safety Commission Interim Safety Standard 16 CFR Part 1209

Compliant with CDPH/EHLB/Standard Method Version 1.1, 2010

CSI MasterFormat® 07 21 23
AFT Cellulose Insulation Specifications
For spec help, contact us or call 419-562-1337

Download all documents

See LCA, interpretation & rating systems

See materials, interpretation & rating systems

SM Transparency Report (EPD)™ – Multi-Attribute Optimization

VERIFICATION	LCA
3rd party reviewed	NSF
Transparency Report (EPD)	
3rd party verified	NSF

Validity: 2020/07/01 – 2025/07/01
AFT – 20200701 – 001

This EPD was independently verified by NSF to ISO 21930:2017, EN 15804, the ULE PCR and ISO 14025:2006; also to LEED v4.0 and 4.1 beta for EPD optimization credit eligibility.

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SUMMARY
Reference PCR: UL Building Envelope Thermal Insulation, 04/18 – 02/23; SM Part B: Benchmarking Addendum

Regions; system boundaries
North America; Cradle to grave

Functional unit / reference service life:
1 m^2 of installed insulation w/packaging; thickness that gives an avg thermal resistance of RSI = 1 m^2·K/W over 75 years.

LCIA methodology: TRACI 2.1

LCA software; LCI database
SimaPro Analyst 8.5.2.0
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LCA results & interpretation

AFT Carbon Smart™ Loose-Fill Cellulose Insulation

Life cycle assessment

Scope and summary

◯ Cradle to gate ◯ Cradle to gate with options ✔ **Cradle to grave**

Application

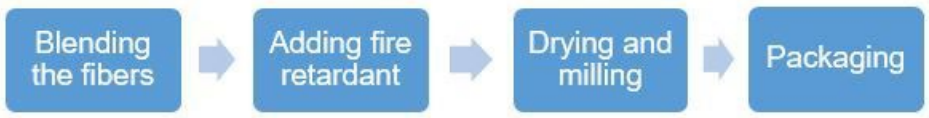
Carbon Smart™ Loose-Fill Cellulose Insulation is made from any cellular plant source although it typically comes from waste paper products. It is installed by using an insulation blowing machine. Carbon Smart™ Loose-Fill Cellulose Insulation is typically applied to enclosed areas, unfinished attic floors, and other hard to reach places.

Functional unit

Reference service life: 75 years. One square meter of installed insulation material, packaging included, with a thickness that gives an average thermal resistance of RSI=1m2·K/W over a period of 75 years. ASTM C518 was used to determine R-value.
Reference flow range: 0.960 kg
Thickness: .0381 m
Density: 25.214 kg/m^3

Manufacturing data

Reporting period: January--December, 2018
Representing 1 location in United States: Bucyrus, OH
Carbon Smart™ Loose-Fill Cellulose Insulation is produced in several manufacturing steps that involve the blending of fibers, adding the fire retardant in liquid form to the fibers, and then drying and milling the fibers before placing them into plastic bags.



All submitted data were checked for quality multiple times on the plausibility of inputs and outputs. All questions regarding data were resolved with AFT.

Default installation, packaging, and disposal scenarios

At the installation site, insulation products are unpackaged and installed with a blowing machine. The potential impact of the blower is included in this study. Plastic packaging used to wrap final product, is disposed 100% to landfill. No maintenance or replacement is required to achieve the product's life span. After removal, the insulation is assumed to be landfilled, not re-used or recycled.

Material composition greater than 1% by weight

FLOW	MASS PERCENTAGE
Boric acid	6.12%
Ammonium sulfate	5.54%
Wastepaper/ paper fiber/ newspaper/ newsprint/cellulose fibers (loose and baled)/ mixed recycled papers	86.01%

What's causing the greatest impacts

All life cycle stages

The raw materials acquisition, transportation to the manufacturing facility, and manufacturing stages (A1-A3) dominate the results for all impact categories. This study assessed a multitude of inventory and environmental indicators. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes. The overall results are consistent with expectations for insulation product life cycles, as this product is not associated with energy consumption during its use stage. Transportation of the final products to distribution facilities (A4) is the second highest contributor to these impact categories.

The impacts during installation are associated with packaging disposal and the gas and electricity used for an installation blower machine. There is no impact associated with the use stage. While insulation can influence building energy performance, this is outside the scope of this study. Additionally, it is assumed that insulation does not require any maintenance to achieve its reference service life, which is modeled as being equal to that of the building. No replacements are necessary; therefore, results represent the production of one square meter of insulation at a thickness defined by the functional unit.

At the end of life, insulation is removed from the building and land-filled. No substances required to be reported as hazardous are associated with the production of this product.

Raw materials acquisition stage

The raw material acquisition, transportation to manufacturing facility, and the manufacturing stages (A1-A3) dominate the impacts due to the raw materials. Boric acid and ammonium sulfate, used as fire retardants, are the main contributors. Emissions from transportation (A2) of raw materials and wastepaper to manufacturing facility contribute mainly to fossil fuel depletion, ozone depletion and global warming.

The results show that the largest opportunity for reduction of the products' environmental impacts, is in the raw material acquisition and manufacturing phase. This can be done by using alternative materials, reducing transportation distance, turning off certain machines when they are not in use, and recycling dust emissions back into the product to reduce manufacturing impacts.

How our product compares to the industry benchmark

Interpretation summary
In January 2020, the Cellulose Insulation Manufacturers Association (CIMA) and the Cellulose Insulation Manufacturers Association of Canada (CIMAC) published an industry-wide Type III EPD in which AFT participated; it followed both the UL PCR and SM Part B benchmarking addendum that enables comparison of a product-specific EPD to the industry benchmark. The SM Part B benchmarking addendum requires the selection of the greatest improvement and lowest performing impact categories.

Carbon Smart™ Loose-Fill Cellulose Insulation LCIA results show environmental performance improvements across all impact categories evaluated in this study except for non-carcinogenics. The impacts are due to stages A1-A3 as follows:

- A1 Boric acid and ammonium sulfate
- A2 Transportation of boric acid and ammonium sulfate A3
- Electricity consumption during manufacturing

Total impacts by life cycle stages [mPts/func unit]

LIFE CYCLE STAGE	MPTS/FUNC UNIT
Raw Material Acquisition and Manufacturing	3.40E-05
Transportation	8.22E-06
Installation and Maintenance	1.78E-07
Transportation	2.49E-06
Disposal	7.25E-07

About CIMA/CIMAC industry-wide EPD results

The CIMA/CIMAC industry-wide EPD for Carbon Smart™ Loose-Fill Cellulose Insulation serves as a product group benchmark to which product-specific results can be compared. A Monte-Carlo uncertainty analysis was done to measure how the LCA results, from each product in the industry-wide, vary due to the differences in data inputs and to determine if each product falls within the industry average mean. A 95% confidence level demonstrates confidence that the results are representative of all cellulose insulation manufacturers.

Three impact categories are used for comparison: The PCR requires global warming while acidification and smog were selected because they had the lowest variability as shown by the CIMA/CIMAC Monte-Carlo uncertainty analysis. When a manufacturer compares its product-specific results, if the environmental impact is **within the range**, it is determined to be **equivalent** to the industry impact; **below** the range, **lower** impact; **above** the range, **higher** impact.

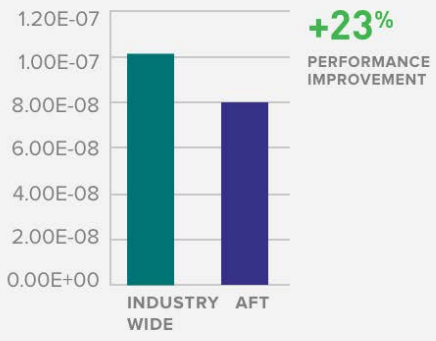
Uncertainty analysis results from CIMA IW for all three impact categories

IMPACT CATEGORIES	AVERAGE MEAN	95% CONFIDENCE INTERVAL
Global warming, kg CO2 eq	7.04E-01	6.39E-01 – 7.85E-01
Acidification, kg SO2 eq	4.43E-03	3.71E-03 – 5.40E-03
Smog, kg O3 eq	5.24E-02	4.32E-02 – 6.58E-02

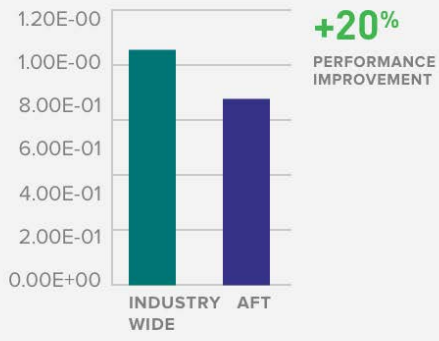
Total impacts: Product-specific compared to industry-wide

Highest and lowest performing impact categories

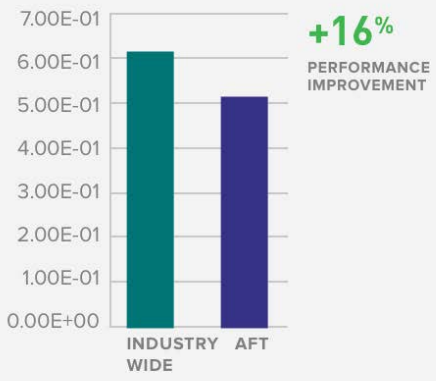
Ozone depletion (kg CFC-11 eq)



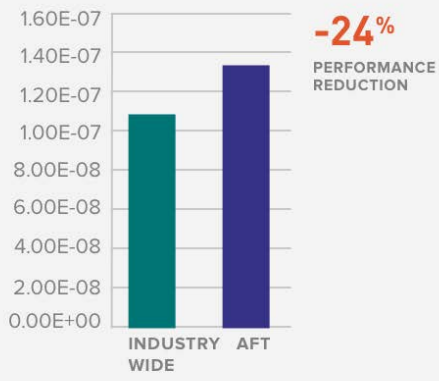
Fossil fuel depletion (MJ surplus)



Global warming (kg CO2 eq)



Non-carcinogenics (CTUh)



Electricity consumption during manufacturing does not contribute significantly to the overall impacts of A1-A3, but becomes significant when comparing to industry average results and identifying the contributors to performance improvement. AFT's electricity consumptions is smaller than that of other manufacturers.

Comparison of impact categories from industry-wide EPD based on uncertainty analysis

- 17% improvement: Global warming
- 7% improvement: Acidification
- 17% improvement: Smog

The global warming improvement is a result of the absence of cardboard box as a material ingredient which is commonly used by other cellulose insulation manufacturers. The impacts for the other two categories come from boric acid (A1), ammonium sulfate (A1), transportation (A2), and electricity (A3). Electricity consumption during manufacturing is lower than the industry average.

Greatest improvement impact categories (lower impact results than average)

- 23% lower: Ozone depletion
- 21% lower: Fossil fuel

Carbon Smart™ Loose-Fill Cellulose Insulation has better environmental performance in these impact categories than the industry average results but does not represent that the AFT insulation is better than any specific manufacturer participating in the industry average.

Lowest performing impact category (higher impact results than average)

- 24% higher impacts in this category: Non-carcinogenics

Non-carcinogenics is the only category where impacts were greater than the industry average. Zinc sulfate, used as a fire retardant, contributes 50% of the impacts to this category. Other cellulose insulation manufacturers do not include zinc sulfate as a material ingredient.

How we're making it greener

AFT has entered into a carbon free power purchase agreement starting in 2021 to continue on the path of creating a low embodied carbon product by reducing impacts during manufacturing.

Cellulose insulation has very low embodied carbon due to the use of recycled raw material content, low embodied energy during manufacturing, and carbon sequestration.

- Cellulose insulation is recyclable because it is made with 85%, or more, recovered content, most of which is post-consumer. A medium size cellulose insulation plant will convert three to five truckloads, or more, of recovered paper to energy-saving insulation
- each production shift.
  The energy used to make cellulose insulation is referred to as embodied energy. It includes the energy required to transport raw materials, manufacture and distribute the product. Using mostly locally sourced materials manufactured in electrically-driven mills, which can be shut down between production runs and do not need
- to run 24x7, cellulose insulation is an extremely energy efficient product to produce.
  Since the primary feedstock -- recovered paper fibers -- is derived from trees, cellulose insulation sequesters carbon in the walls and ceilings of homes for the life of the building.

See how we make it greener

LCA results

LIFE CYCLE STAGE	A1-A3 RAW MATERIAL ACQUISITION AND MANUFACTURING	A4 TRANSPORTATION	A5, B1-B7 INSTALLATION AND MAINTENANCE	C2 TRANSPORTATION	C4 DISPOSAL/ REUSE/RECYCLING
Information modules: Included I Stages C1, C3, and D are excluded. In the installation and maintenance phase, packaging waste and electricity or gas used by the insulation blowing machines in module A5 are the only contributors to the potential impacts.	**A1 Raw Materials**	**A4 Transporation/ Delivery**	**A5 Construction/ Installation**	**C2 Transportation**	**C4 Disposal**
	A2 Transportation		**B1 Use**		
	A3 Manufacturing		**B2 Maintenance**		
			B3 Repair		
			B4 Replacement		
			B5 Refurbishment		
			B6 Operational energy use		
			B7 Operational water use		
					

SM 2013 Learn about SM Single Score results

Impacts per 75 years of service	3.40E-05 mPts	8.22E-06 mPts	1.78E-07 mPts	2.49E-06 mPts	7.25E-07 mPts
Materials or processes contributing >20% to total impacts in each life cycle stage	Boric acid and ammonium sulfate used in the production of the insulation.	Truck and trailor, rail, and ship transportation used to transport product to manufacturing site.	Transportation to disposal, energy required for installation with a blowing machine, and disposing of packaging materials.	Transportation to landfill.	Landfilling of product.

TRACI v2.1 results per functional unit

LIFE CYCLE STAGE	RAW MATERIAL ACQUISITION AND MANUFACTURING	TRANSPORTATION	INSTALLATION AND MAINTENANCE	TRANSPORTATION	DISPOSAL/REUSE/ RECYCLING
Ecological damage					
Impact category / Unit					
Acidification / **kg SO_2 eq**	3.01E-03	3.25E-04	1.76E-05	9.85E-05	6.59E-05
Eutrophication / **kg N eq**	3.14E-04	4.63E-05	1.41E-06	1.40E-05	7.59E-06
Global warming (Embodied carbon) / **kg CO_2 eq**	3.89E-01	8.70E-02	1.78E-03	2.64E-02	8.30E-03
Ozone depletion / **kg CFC-11 eq**	4.91E-08	2.10E-08	3.01E-10	6.37E-09	3.00E-09
Human health damage					
Impact category / Unit					
Carcinogenics / **CTU_h**	5.01E-09	6.36E-10	2.25E-11	1.93E-10	7.90E-11
Non-carcinogenics / **CTU_h**	1.09E-07	1.87E-08	2.30E-10	5.67E-09	7.79E-10
Smog / **kg O_3 eq**	2.66E-02	6.61E-03	4.95E-04	2.00E-03	1.58E-03
Additional environmental information					
Impact category / Unit					
Respiratory effects / **kg $PM_{2.5}$ eq**	3.38E-04	5.90E-05	9.86E-07	1.79E-05	8.07E-06
Ecotoxicity / **CTU_h**	5.10E-01	3.51E-01	4.01E-03	1.06E-01	1.12E-02
Fossil fuel depletion / **MJ, LHV**	5.87E-01	1.77E-01	4.65E-03	5.36E-02	2.60E-02

References

AFT LCA Background Report
AFT Loose-Fill Cellulose Insulation Products LCA Background Report (public version), AFT 2020. SimaPro Analyst 9.0.0.49, ecoinvent 3.1, 2.2 database.

CIMA/CIMAC LCA Background Report
CIMA and CIMAC Loose-Fill Cellulose Insulation Products LCA Background Report (public version), CIMA and CIMAC 2019. SimaPro Analyst 8.5.2.0, ecoinvent 3.1, 2.2 database.

CIMA/CIMAC Transparency Report (EPD)
This industry-wide EPD is the product group benchmark to which product-specific EPDs can be compared. It was done in conformance with the benchmarking guidance provided in the PCR, UL Building Envelope Thermal Insulation 04/18 –02/23; and the **SM Part B: Benchmarking Addendum** | Carbon Smart™ Loose-Fill Cellulose Insulation. Manufacturers interested in participating retroactively or making product-specific EPD comparisons, see the Benchmarking Addendum for instructions or contact Sustainable Minds.

PCRs

ISO 21930:2017 serves as the core PCR along with EN 15804 and UL Part A.

ULE PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements v3.1
May 2, 2018. Technical Advisory Panel members reviewed and provided feedback on content written by UL Environment and USGBC. Past and present members of the Technical Advisory Panel are listed in the PCR.

ULE PCR Part B: Building Envelope Thermal Insulation
Version 2.0, April 2018. PCR review conducted by Thomas Gloria, PhD (chair, t.gloria@industrial-ecology.com); Andre Desjarlais; and Christoph Koffler, PhD.

ISO 14025, "Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services", ISO21930:2017

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. TRs/EPDs of products that conform to the same PCR and include the same life cycle stages, but are made by different manufacturers, may not sufficiently align to support direct comparisons. They therefore, cannot be used as comparative assertions unless the conditions defined in ISO 14025 Section 6.7.2. 'Requirements for Comparability' are satisfied. Comparison of the environmental performance of building envelope thermal insulation using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under the PCR. Environmental declarations from different programs (ISO 14025) or based upon differing PCRs may not be comparable. Full conformance with the PCR for building envelope thermal insulation allows EPD comparability only when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category PCR, and use equivalent scenarios with respect to construction works. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI data sets may lead to different results upstream or downstream of the life cycle stages declared. Compliance with model building codes does not always ensure compliance withstate or local building codes, which may be amended versions of these model codes. Always check with local building code officials to confirm compliance. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Limitations to this study is that not all manufactures in N.A. participated in the industry-wide study to which the AFT results were compared; furthermore, the results published in this LCA are the same ones that were used in the industry wide.

The comparative assessment is considered valid for at least three years from the verification start date as per LEED V4.1 beta requirements.

Rating systems

The intent is to reward project teams for selecting products from manufacturers who have verified improved life-cycle environmental performance.

LEED BD+C: New Construction | v4 - LEED v4
Building product disclosure and optimization
Environmental product declarations
Option 1: Environmental Product Declaration

○ Industry-wide (generic) EPD	½ product
✓ Product-specific Type III EPD	1 product

Option 2: Multi-attribute optimization

✓ Product-specific Type III EPD	

LEED BD+C: New Construction | v4.1 - LEED v4.1
Building product disclosure and optimization
Environmental product declarations
Option 1: Environmental Product Declaration

○ Industry-wide (generic) EPD	1 product
✓ Product-specific Type III EPD	1.5 products

Option 2: Multi-attribute optimization
The comparative analysis must show impact reduction(s) of at least 10% in the global warming potential (GWP) impact category and must include a narrative describing how the impact reductions were achieved.

✓ Product-specific Type III EPD	1.5 products

Green Globes for New Construction and Sustainable Interiors
Materials and resources

✓ NC 3.5.1.2 Path B: Prescriptive Path for Building Core and Shell	
✓ C 3.5.2.2 and SI 4.1.2 Path B: Prescriptive Path for Interior Fit-outs	

Collaborative for High Performance Schools National Criteria
MW 7.1 – Environmental Product Declarations

✓ Third-party certified type III EPD	2 points

BREEAM New Construction 2018
Mat 02 - Environmental impacts from construction products
Environmental Product Declarations (EPD)

○ Industry average EPD	.5 points
○ Multi-product specific EPD	.75 points
✓ Product-specific EPD	1 point

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3rd party reviewed	✓ NSF
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How we make it greener

AFT Carbon Smart™ Loose-Fill Cellulose Insulation

See LCA results by life cycle stage

RAW MATERIAL ACQUISITION

Utilize recycled content

Cellulose insulation is an inherently recycled product with 85%, or more, recovered content, most of which is postconsumer. A medium size cellulose insulation plant will convert three to five truckloads, or more, of recovered paper to energy-saving insulation each production shift. Since the primary feedstock -- recovered paper fibers -- is derived from trees cellulose insulation sequesters carbon in the walls and ceilings of homes for the life of the building.

Many cellulose insulation manufacturers have their own recycling programs and "paper drives" to collect paper and cardboard and use local community recycling programs as material sources. Here are hundreds of tons of waste paper that will not be landfilled , incinerated, or deinked using toxic chemicals. Instead, it, and its embodied carbon, will be sequestered in the walls and ceilings of homes, making them more energy-efficient.

TRANSPORATION

Compression packaging and regional production

Recovered paper goes from potentially problematic trash to energy-saving insulation ready for shipment in just a few minutes in cellulose insulation plants.

Cellulose insulation is compressively packaged to 10x, or more, nominal settled density for maximum transportation efficiency. The compressive packaging allows for fewer deliveries and more cellulose insulation on the transportation vehicle compared to other types of insulation.

MANUFACTURING

Low-energy manufacturing

Cellulose insulation manufacturing is a low-energy process, resulting in material with the least embodied energy of any of the commonly-used insulation products. The production process generates no waste, other than dust, which is confined within the production system and filtered out of air discharged to the environment. Fire retardants used in cellulose insulation are considered to be of low or no toxicity. Improvements in fire retardant processing and infusion technology have resulted in historically low fire retardant content with no loss of fire safety.

AFT recycles their dust back into the product. These companies produce no on-site air or solid waste pollution in the manufacturing process.

INSTALLATION AND USE

Be confident in cellulose insulation safety

Cellulose insulation is often installed in interior walls to make homes quieter and more fire safe.

Non-irritating cellulose insulation requires no special protective clothing during installation. Many cellulose insulation products have been tested for VOC emission and have been found to be low VOC sources.

Low carbon footprint homes

Cellulose insulation has been a preferred material for reinsulating walls in older homes. In many cases cellulose can be added to walls with existing, but inadequate, insulation.

AFT encourages a revolutionary new concept for creating energy efficient homes that offer the best solution to minimize energy consumption, reduce the amount of paper going to landfills and limit carbon emissions associated with construction and housing— Building lower carbon footprint homes.

New research on the use of wood-intensive construction and cellulose insulation products in homes shows it is actually possible to lower the carbon footprint of houses, so they become "carbon sinks" capable of sequestering carbon for the life of the dwelling. The carbon rich wood and cellulose wood fiber stays in the home for years effectively trapping the carbon from escaping into the environment.

Utilizing wood products and cellulose insulation with naturally high amounts of carbon in home building is a simple and highly effective method of lowering the carbon footprint of homes to sequester carbon. The role wood can play in mitigating climate change was specifically recognized as early as 2003 in the European Commission's 6th Environment Action Programme.

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Contact us

Additional EPD content required by:
ULE PCR Parts A and B for Building Envelope Thermal Insulation

AFT Carbon Smart™ Loose-Fill Cellulose Insulation

Data

Background This product specific declaration was created by collecting product data over the course of a year for AFT Carbon Smart™ Loose-Fill Cellulose Insulation. The reference service life applies for the reference in-use conditions only.

Allocation the allocation methods used were re-examined according to the updated allocation rules in ISO 21930:2017 and we were determined to be in conformance; no updates to allocation methods were made.

Cut-off criteria For the inclusion of mass and energy flows are 1% of renewable primary resource (energy), 1% nonrenewable primary resource (energy) usage, 1% of the total mass input of that unit process, and 1% of environmental impacts. The total of neglected input flows per module does not exceed 5% of energy usage, mass, and environmental impacts. The only exception to these criteria is substances with hazardous and toxic properties, which must be listed even when the given process unit is under the cut-off criterion of 1% of the total mass. No known flows are deliberately excluded from this declaration. Any biogenic carbon is assumed to be sequestered in landfill.

Scenarios and additional technical information

PARAMETER	VALUE	UNIT
Transport to the building site [A4]		
Vehicle type	20T Truck	
Range of distance from manufacturer to installation site	482.8	km
Fuel Type	Diesel (250)	Liters
Weight	19,215,345	kg
Installation into the building [A5]		
Distance from installation site to disposal	161	km
Mass of packaging waste to disposal	9.09E-02	kg
GWP based in biogenic carbon content of plastic packaging	0	kg CO_2e
Electricity Consumption	406.1	kWh
Gasoline	11962.19	Liters
Disposal/reuse/recycling [C1-C4]		
Distance from installation site to disposal	161	km
Mass of product waste to disposal	.9606	kg

LCIA results, resource use, output and waste flows, and carbon emissions and removals for AFT Carbon Smart Loose-fill Cellulose Insulation per functional unit

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	Total
LCIA results																
Acidification	kg SO2eq	3.01E-03	3.25E-04	1.76E-05	0	0	0	0	0	0	0	0	9.85E-05	0	6.59E-05	**3.52E-03**
Eutrophication	Kg N eq	3.14E-04	4.63E-05	1.41E-06	0	0	0	0	0	0	0	0	1.40E-05	0	7.59E-06	**3.83E-04**
Global warming	kg CO_2 eq	3.89E-01	8.70E-02	1.78E-03	0	0	0	0	0	0	0	0	2.64E-02	0	8.30E-03	**5.12E-01**
Ozone depletion	kg CFC-11	4.91E-08	2.10E-08	3.01E-10	0	0	0	0	0	0	0	0	6.37E-09	0	3.00E-09	**7.98E-08**
Smog	kg O_3 eq	2.66E-02	6.61E-03	4.95E-04	0	0	0	0	0	0	0	0	2.00E-03	0	1.58E-03	**3.73E-02**
Fossil fuel depletion	MJ, LHV	5.87E-01	1.77E-01	4.65E-03	0	0	0	0	0	0	0	0	5.36E-02	0	2.60E-02	**8.49E01**
Carcinogenics	CTUh	5.01E-09	6.36E-10	2.25E-11	0	0	0	0	0	0	0	0	1.93E-10	0	7.90E-11	**5.94E-09**

Resource use indicators

Renewable primary energy used as energy carrier (fuel)	MJ, LHV	6.67E-02	6.02E-03	1.01E-04	0	0	0	0	0	0	0	0	1.82E-03	0	1.00E-03	**7.64E-02**
Renewable primary resources with energy content used as material	MJ, LHV	1.32E-01	0	2.16E-04	0	0	0	0	0	0	0	0	0	0	0	**1.32E-01**
Total use of renewable primary resources with energy content	MJ, LHV	1.99E-01	6.02E-03	3.17E-04	0	0	0	0	0	0	0	0	1.82E-01	0	1.00E-03	**2.09E-01**
Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	4.76E00	9.72E-01	2.53E-02	0	0	0	0	0	0	0	0	2.95E-01	0	1.33E-01	**6.20E00**
Non-renewable primary resources with energy content used as material	MJ, LHV	3.07E-03	0	0	0	0	0	0	0	0	0	0	0	0	0	**3.07E-03**
Total use of non-renewable primary resources with energy content	MJ, LHV	4.77E00	9.72E-01	2.55E-02	0	0	0	0	0	0	0	0	2.95E-01	0	1.44E-01	**6.20E00**
Secondary materials	kg	5.82E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	**5.82E-01**
Renewable secondary fuels	MJ, LHV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Non-renewable secondary fuels	MJ, LHV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Recovered energy	MJ, LHV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Use of net fresh water resources	m3	7.62E-01	6.65E-02	1.11E-03	0	0	0	0	0	0	0	0	2.02E-02	0	1.09E-02	**8.61E-01**

Output flows and waste category indicators

Hazardous waste disposed	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Non-hazardous waste disposed	kg	7.41E-01	0	6.70E-02	0	0	0	0	0	0	0	0	0	0	6.70E-01	**7.37E-01**

High-level radioactive waste, conditioned, to final repository	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Materials for recycling	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Exported energy	MJ, LHV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Carbon emissions and removals

Biogenic Carbon Removal from Product	kg CO_2	1.42E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	**1.42E-06**
Biogenic Carbon Emission from Product	kg CO_2	7.59E-03	0	0	0	0	0	0	0	0	0	0	0	0	1.47E-04	**8.10E-03**
Biogenic Carbon Removal from Packaging	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Biogenic Carbon Emission from Packaging	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Calcination Carbon Emissions	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Carbonation Carbon Removals	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	kg CO_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

SM Transparency Report (EPD)™ – Multi-Attribute Optimization

VERIFICATION LCA

3rd party reviewed

Transparency Report (EPD)

3rd party verified

Validity: 2020/07/01 – 2025/07/01
AFT – 20200701 – 001

This EPD was independently verified by NSF to ISO 21930:2017, EN 15804, the ULE PCR and ISO 14025:2006; also to LEED v4.0 and 4.1 beta for EPD optimization credit eligibility.

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SUMMARY

Reference PCR: UL Building Envelope Thermal Insulation, 04/18 – 02/23; SM Part B: Benchmarking Addendum

Regions; system boundaries
North America; Cradle to grave

Functional unit / reference service life:
1 m^2 of installed insulation w/packaging; thickness that gives an avg thermal resistance of RSI = 1 m^2·K/W over 75 years.

LCIA methodology: TRACI 2.1

LCA software; LCI database
SimaPro Analyst 8.5.2.0
EcoInvent 3.1, 2.2

LCA conducted by: Sustainable Minds

Public LCA:
AFT Loose-Fill Cellulose Insulation Products

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