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.’

Performance dashboard

Features & functionality

Environment & materials
Improved by:
- 85%, or more, recovered content – most of it post-consumer.
- Much material used in cellulose insulation is locally-sourced recovered paper and cardboard
- Low or zero VOC emissions

Certifications, rating systems & disclosures:
- ASTM Standard C739
- Canada Consumer Product Safety Act 16-2-B Part 1404
- CAN/ULC S703

Participating manufacturers:
Advanced Fiber Technology
Applegate Insulation
Can-Coil Industries
Cell-Pak
Cleanfiber
Climatizer
FiberLite
Igloo Cellulose
International Cellulose Corporation
Mason City Recycling Center
Nu-Wool
Soprema
Thermo-Kool

CSI MasterFormat® 07 21 23
Cellulose Insulation General Specifications
For spec help, contact us or call 888-851-2462

Validity: 2019/12/23 – 2024/12/23

Reference PCR
LCA: Building envelope thermal insulation, 04/18 – 02/23
Regions; system boundaries
North America; Cradle to grave
Functional unit/reference service life: 1 m² of installed insulation w packaging: thickness that gives an avg thermal resistance of RSI = 1 m²·K/W over 75 years.

LCIA methodology: TRACI 2.1
LCA conducted by:
Sustainable Minds
Public LCA: Conventional Loose-Fill Cellulose Insulation Products

See LCA, interpretation & rating systems

Cellulose Insulation Manufacturers Association
133 S. Keowee St
Dayton, OH 45402
www.cellulose.org
937-222-2462

Contact us
### Introduction

Cradle-to-grave Life Cycle Impact Assessment (LCIA) was performed for insulation products using a methodology developed by Sustainable Minds®. The focus was on determining which products have the lowest impacts throughout their life cycle. Three impact categories were considered: global warming potential, ecotoxicity, and ozone depletion. These categories help to transparently measure, compare, and reduce environmental impact.

### Global Warming Potential

Global warming potential methodology uses the median, the average lower limit (2.50%), and average building industry to transparently measure, compare, and reduce environmental impact. The PCR requires global warming to be reported across three impact categories: building construction stage, manufacturing, and operation. The PCR specifies that the results of the assessment shall be presented in a visual format and include the same life cycle stages, but they may not consider the same impacts. The PCR is designed to enable purchasers and users to compare the potential environmental performance of products.
CIMA/CIMAC Conventional Loose-Fill Cellulose Insulation

See the additional EPD content required by the UL Environment PCR on page 4 of the Transparency Report PDF.

Learn about SM Single Score results

6.39E-01 avg 97.5%

Global warming potential upper limit (97.5%) values of the interval to establish the 20 – 80th building industry to transparently measure, compare, and reduce Leadership Forum and industry partners is designed to enable the Embodied Carbon in Construction Calculator (EC3) from the Carbon Environmental impact is left). When a manufacturer compares its product-specific results, if the sample.

The average is representative of data from all the companies, which provides the uncertainty range for the impact each product falls within the industry average mean.

After removal, the insulation is assumed to be landfilled.

Plastic packaging waste is disposed (100% to landfill), and no milling the fibers before placing them into bags.

Adding the fire retardant in liquid form to the fibers, and then drying and

(Arizona, Colorado, Kentucky, Georgia, Louisiana, Wisconsin)

Density range:

0.6697-6.2748 kg

Material, packaging included, with a thickness that gives an average thermal

Application

LCA results & interpretation

Validity: 2019/12/23 – 2024/12/23

considering the building energy use phase as instructed under the PCR. Full conformance with limitations of comparability more understandable. A limitation to this study is that not all on a life cycle basis.

SM Transparency Reports (TR) are ISO 14025 Type III environmental declarations (EPD) that ISO 14025, “Sustainability in buildings and civil engineering works -- Core which includes the additional EPD content required by the UL Environment production of the

EcoInvent 3.1, 2.2

LCIA methodology:

resistance of RSI = 1 m²·K/W over 75 years.

SUMMARY

stages (A1-A3) dominate the impacts due mainly to the material acquisition, transportation to manufacturing facility, and the manufacturing contribute mainly to fossil fuel depletion and global warming impacts.

These six impact categories are globally deemed mature overall results are consistent with expectations for insulation products’ life

margins or risks. These six impact categories are globally deemed mature overall results are consistent with expectations for insulation products’ life

How we’re making it greener

It is an inherently recycled product with 85%, or more, recovered manufacturing, and sequesters carbon.

Manufacturers are required to use energy compliance with state or local building codes, which may be amended

Note: Compliance with model building codes does not always ensure

Building product disclosure and optimization

LEED BD+C: New Construction | v4 - LEED v4

Collaborative for High Performance Schools National Criteria

Mat 02 - Environmental impacts from construction products

MW 7.1 – Environmental Product Declarations

MW 7.1 – Environmental Product Declarations

www.embodiedcarbon.org

www.cellulose.org

1 pointProduct specific EPD
CIMA/CIMAC Conventional Loose-Fill Cellulose Insulation

Conventional loose-fill cellulose insulation is made from any cellular plant material, packaging included, with a thickness that gives an average thermal resistance of R=3.5 per inch of thickness. The reference service life is 75 years.

At the installation site, insulation products are unpackaged and installed with blowing machines that do not use any motor or gas and electricity, and the blowing process is not associated with energy consumption. Therefore, only installation impacts are associated with packaging disposal and the waste generated during the construction process.

The impact of the raw material acquisition stage is mostly due to the production of the raw material, which includes energy and emissions from the manufacturing process. The raw material is produced in several manufacturing steps that involve the blending of fibers, such as wood pulp, with chemicals such as boron and ammonium sulfate, to prevent the development of mold and insects. This process results in the production of cellulose insulation, which is then transported to the manufacturing facility.

The energy used to make cellulose insulation is referred to as embodied energy. It includes the energy required to transport raw materials, produce the product, and dispose of it. The raw material acquisition stage has the highest embodied energy, followed by the manufacturing stage and the transportation stage.

The impact of the product use stage is dominated by the embodied energy of the product, which is considered to be the energy used during the manufacturing process. The use of the product is not associated with energy consumption, as it does not require any additional measures for comparative purposes.

For all products, waste was dominated by the final disposal of the product. This is because the product is typically disposed of in a landfill, which is responsible for the majority of the waste generated.

The full life cycle analysis (LCA) of the product considers the environmental impact of the product throughout its life cycle, from raw material acquisition to product end-of-life. The LCA results are presented in 3rd party verified and life cycle assessment (LCA) software, such as SimaPro, to ensure the accuracy and reliability of the data.

The LCA results are presented in a table format, which includes life cycle stages, raw material, transportation, manufacturing, and end-of-life. The table also includes the contributions of each stage to the total environmental impact, expressed in kg CO2 eq, kg N eq, kg P eq, and Points. The table shows that the raw material acquisition stage has the highest contribution to the total environmental impact, followed by the manufacturing stage and the transportation stage.

The table also shows that the contribution of each stage to the total environmental impact is less than 20%, as indicated by the use of different colors. This indicates that the LCA results are reliable and accurate, as the contributions of each stage are well-distributed and do not exceed 20%.

The LCA results are used to inform decisions about the environmental impact of the product, and the results can be used to improve the sustainability of the product by identifying areas for improvement and implementing changes to reduce the environmental impact. The LCA results can also be used to compare different products and make informed decisions about which product to choose based on its environmental impact.
Utilizing wood products and cellulose insulation with naturally "carbon sinks" capable of sequestering carbon for the life of the home for years effectively trapping the carbon from escaping into the environment. 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. New research on the use of wood-intensive construction and housing—Building lower 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. Cellulose insulation is compressively packaged to 10x, or more, nominal settled density for maximum transportation efficiency. It 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 ready for shipment in just a few minutes.

Recovered paper goes from potentially problematic trash to here are hundreds of tons of waste paper that will not be landfills and limit carbon emissions associated with construction energy consumption, reduce the amount of paper going to the UL PCR. This environmental product declaration (EPD) was independently verified by NSF to in compliance with the UL PCR.

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 walls and ceilings of homes insulation sequesters carbon in the walls and ceilings of homes for the life of the building.

Low carbon footprint homes have been tested for VOC emission and have been found to be non-irritating cellulose insulation requires no special protective clothing during installation. Many cellulose insulation products contain the UL PCR. This environmental product declaration (EPD) was independently verified by NSF to in compliance with the UL PCR.

Utilize recycled content
Carbon emissions and removals

LCIA results

Output flows and waste category indicators

Disposal/reuse/recycling (C1-C4)

Resource use indicators

Additional EPD content required by: ULE 2013 Part A and B for Building Envelope Thermal Insulation

Conventional Loose-Fill Cellulose Insulation

Data

- Background: The industry standard practice was reviewed by selling product data from our own unit to support each product, where we also measured the energy output and waste flows from each manufacturing location. The data are a weighted average of production volume at each location.
- Abatement: The alternative methods used on a case-by-case basis according to the combined carbon credits in ISO 21930:2017 and are not determined to be in accordance with the updated allocation rules in ISO 21930:2017.
- Co2 offset: For the inclusion of waste and energy flows, they are 1% of the total mass base of each product category, and any calculations for renewable (net) energy. By all the listed processes for 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.
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**Data**

**Scenario and additional technical information**

**Carbon emissions and removals**

**Output flows and waste category indicators**

**Additional EPD content required by:**

**Parameter**

<table>
<thead>
<tr>
<th>Production Processes</th>
<th>Sources used in</th>
<th>Carbon Emissions from</th>
<th>Removals</th>
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<tr>
<th>Parameter</th>
<th>A4 (m)</th>
<th>A5 (m)</th>
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<tbody>
<tr>
<td><strong>Transport to the building site</strong></td>
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<tr>
<td><strong>Installation into the building</strong></td>
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<tr>
<td><strong>Disposal/waste/recycling (C1-C4)</strong></td>
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</tbody>
</table>

**LCI results, resource use, output and waste flows, and carbon emissions and removals for Conventional Loose-Fill Cellulose Insulation are functional unit.**

<table>
<thead>
<tr>
<th>LCI results</th>
<th>kg</th>
<th>MJ, LHV</th>
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<tbody>
<tr>
<td>A1-A3</td>
<td>1.33E00</td>
<td>6.56E-10</td>
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<tr>
<td>A4</td>
<td>7.98E-01</td>
<td>4.79E-05</td>
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<td>B1</td>
<td>1.44E00</td>
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<td>B2</td>
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<tr>
<td>B3</td>
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<tr>
<td>B4</td>
<td>1.24E00</td>
<td>1.55E-02</td>
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<tr>
<td>B5</td>
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</tr>
<tr>
<td>B6</td>
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<tr>
<td>B7</td>
<td>2.98E-02</td>
<td>2.49E-11</td>
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<tr>
<td>C1-C4</td>
<td>5.36E-01</td>
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<td>C5</td>
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<td>C7</td>
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<table>
<thead>
<tr>
<th>Resource use indicators</th>
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<tbody>
<tr>
<td>Biomass primary energy sources per kg (bag)</td>
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<tr>
<td>15.08E-01</td>
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<tr>
<td>Multi-source primary energy sources per kg (bag)</td>
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<td>4.90E-01</td>
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<tr>
<td>Total use of renewable energy sources per kg (bag)</td>
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<td>1.59E+00</td>
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<tr>
<td>Biomass primary energy sources per kg (plant)</td>
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<td>15.08E-01</td>
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<td>Multi-source primary energy sources per kg (plant)</td>
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<td>4.90E-01</td>
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<tr>
<td>Total use of renewable energy sources per kg (plant)</td>
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<td>1.59E+00</td>
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<td>Secondary materials</td>
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<td>Renewable energy</td>
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<table>
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<tr>
<th>Output and waste stream indicators</th>
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<tr>
<td>Air emissions to the atmosphere</td>
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<td>Biogas emissions</td>
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<tr>
<td>Non-hazardous waste</td>
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<tr>
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<tr>
<td>Disposal to a landfill or incineration</td>
</tr>
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<tr>
<td>Energy use in the material</td>
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<tr>
<td>1.42E+00</td>
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<table>
<thead>
<tr>
<th>Carbon emissions and removals</th>
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<tr>
<td>Biogas Carbon Dioxide Emission from Biogas Production</td>
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<td>2.38E-02</td>
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<tr>
<td>Biogas Carbon Dioxide Emission from Biogas Combustion</td>
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<td>Biogas Carbon Dioxide Emission from Biogas Flaring</td>
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<tr>
<td>Biogas Carbon Dioxide Emission from Biogas Destruction</td>
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<tr>
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<td>Non-hazardous waste</td>
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