

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 21930:2017

SmartEPD-2024-019-0139-01

Blanket Insulation



Date of Issue:
Jun 21, 2024

Expiration:
Jun 21, 2029

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Jun 21, 2024

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General Information

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| | |
|-----------------------------|---|
| Product Name: | Blanket Insulation |
| Functional Unit: | 1 m2 of material with RSI = 1m2K/W |
| Declaration Number: | SmartEPD-2024-019-0139-01 |
| Date of Issue: | June 21, 2024 |
| Expiration: | June 21, 2029 |
| Last updated: | June 21, 2024 |
| EPD Scope: | Cradle to gate with other options A1 - A3, A4, A5, C1 - C4 |
| Market(s) of Applicability: | North America |

Reference Standards

| | |
|--------------------------------|--|
| Standard(s): | ISO 21930:2017 |
| Core PCR: | UL Part A v4, UL PCR for Building-Related Products and Services Part A v.4, ISO 21930:2017 Date of issue: March 01, 2022 |
| Sub-category PCR: | UL Part B: Building Envelope Thermal Insulation Products v.3 Date of issue: April 10, 2023 Valid until: October 10, 2024 |
| Sub-category PCR review panel: | 📄 Contact Smart EPD for more information. |
| General Program Instructions: | 📄 Smart EPD General Program Instructions v.1.0, November 2022 |

Verification Information

| | |
|-----------------------|---|
| LCA Author/Creator: | 📄 Saint-Gobain North American ESG Sustainability Group ✉ sustainability@saint-gobain.com |
| EPD Program Operator: | 📄 Smart EPD ✉ info@smartepd.com 🌐 www.smartepd.com 📍 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA |

Verification:

Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 :

External

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Independent external verification of EPD, according to ISO 14025 and reference PCR(s) :

External

🌐 Anni Oviir | ✉️ anni.ovii@lcasupport.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products 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 whole building life cycle. EPD comparability is only possible 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. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Organization Information

CertainTeed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of interior building materials including gypsum, ceilings, and insulation as well as exterior building materials which include roofing, vinyl siding, trim, and water protection.

Further information can be found at: <https://www.saint-gobain-northamerica.com/>

Product Description

CertainTeed is dedicated to Building Responsibly with fiberglass insulation product that are engineered, produced and shipped with a commitment to minimizing environmental impact and improving energy savings. The Blanket Insulation products are composed of tan, uniformly textured, inorganic fibrous glass and bonded with a thermoset resin to form a blanket insulation. CertainTeed's Blanket insulation products Included in this EPD are: Metal Building Insulation, Canadian Metal Building Insulation, Metal Building Insulation Filler Blanket, High Temp Blanket, Universal Blanket. The sizes for the products in this EPD range from R-2.1 to R-30. These values indicate the insulation's resistance to heat transfer, with higher values indicating better insulation performance. This range of R-values makes CertainTeed's Universal Blanket insulation an excellent choice for various HVAC systems, from low to high-pressure systems. CertainTeed Blanket Insulation acts as both thermal and acoustical insulation in ceilings, walls and floors. The functional of the products reported in this document is 1 square meter of insulation material with a thickness that provides an average thermal resistance $R_{si} = 1m^2K/W$ ($R_{us}=5.67$) with a building service life of 60 years.

Further information can be found at: <https://www.certainteed.com/products/technical-insulation-products/universal-blanket>

Product Information

Functional Unit: 1 m² of material with RSI = 1m²K/W

Mass: 0.445 kg

Product Specificity: Product Average

Product Specific

Averaging:

The reference data for this LCA is from the five CertainTeed manufacturing facilities (Ottawa, OT, Redcliff, AB, Kansas City, KS, Athens, GA, Chowchilla, CA) for calendar year 6/1/2021 - 5/31/2022. In evaluating the environmental impacts associated with a Blanket Insulation, a production-weighted average for five facilities was employed. This approach was utilized to comprehensively understand the overall environmental performance. The approach of assigning weights to each facility's data based on its production output or contribution to the overall system was adopted. The production-weighted average method considers the varying scales and capacities of the five facilities, ensuring that the environmental impacts are representative of the actual production volumes at each site. This approach provides a more nuanced and realistic assessment, as it acknowledges that facilities with larger production capacities may have a proportionally more significant influence on the overall environmental footprint. To calculate the production-weighted average, the following steps were likely taken. First, comprehensive data on the five facilities' environmental inputs and outputs were gathered, including energy consumption, raw material usage, emissions, and waste generation. Second, the production volumes for each facility were determined for the specific time period under consideration, measured in units of product output, mass, or any other relevant metric. Third, weights were assigned to each facility based on its production volume, with those facilities with higher production volumes receiving higher weights in the calculation. Fourth, the environmental data for each facility were adjusted by multiplying the data values by their respective weights. This adjustment ensures that facilities with larger production volumes contribute more significantly to the overall assessment. Finally, the adjusted environmental data from all five facilities were aggregated to calculate the production-weighted average environmental impact indicators, such as carbon footprint, energy consumption, or other relevant metrics. By employing a production-weighted average, this LCA approach provides a more accurate representation of the environmental performance of the entire system, considering both the diversity of facilities and their respective production contributions.

Plants

-  **CertainTeed Interior Products Group (Athens, GA)**
425 Athena Dr, Athens, GA 30601, USA
-  **CertainTeed**
Ottawa, ON, Canada
-  **CertainTeed Interior Products Group (Kansas City, KS)**
103 Funston Rd, Kansas City, KS 66115, USA
-  **Redcliff, AB**
101 1 St NE, Redcliff, AB T0J 2P0, Canada
-  **CertainTeed Interior Products Group (Chowchilla, CA)**
17775 Ave 23 1/2, Chowchilla, CA 93610, United States

Product Specifications

| | |
|--------------------------------------|--|
| Product Classification Codes: | EC3 - ThermalMoistureProtection -> Insulation -> BlanketInsulation |
| Form Factor: | ThermalMoistureProtection >> Insulation >> BlanketInsulation |
| Insulation type: | Fiberglass |

Material Composition

| Material/Component Category | Origin | % Mass |
|-----------------------------|--------|-----------|
| Borax | None | 9-12 |
| Manganese Dioxide | None | 0.1-0.5 |
| Nepheline/Feldspar | None | 1-3 |
| Soda Ash | None | 9-12 |
| Burnt Lime/Quicklime | None | 0.1-0.5 |
| Sodium Nitrate | None | 0.01-0.05 |
| Cullet, Curbside Glass | None | 9-12 |
| Sand | None | 44-46 |
| Dolomite | None | 5-7 |
| Limestone | None | 1-3 |
| Wax | None | 0.1-0.5 |
| Silane | None | 0.1-0.5 |
| Silicone | None | 0.01-0.05 |
| Resin | None | 1-3 |
| Binder | None | 8-10 |

| Packaging Material | Origin | kg Mass |
|---------------------|--------|----------|
| Plastic shrink film | None | 1.63E-03 |
| polypropylene bags | None | 7.42E-04 |

Hazardous Materials
 No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

- Primary Data Year: 2022
- Manufacturing Specificity:
- Industry Average
 - Manufacturer Average
 - Facility Specific

Software and LCI Data Sources

| | |
|-----------------------------|--|
| LCA Software: |  GaBi v. 10.0 |
| LCI Foreground Database(s): |  GaBi Professional Database v. 2022 |
| LCI Background Database(s): |  Ecoinvent v. 3.9.1 |

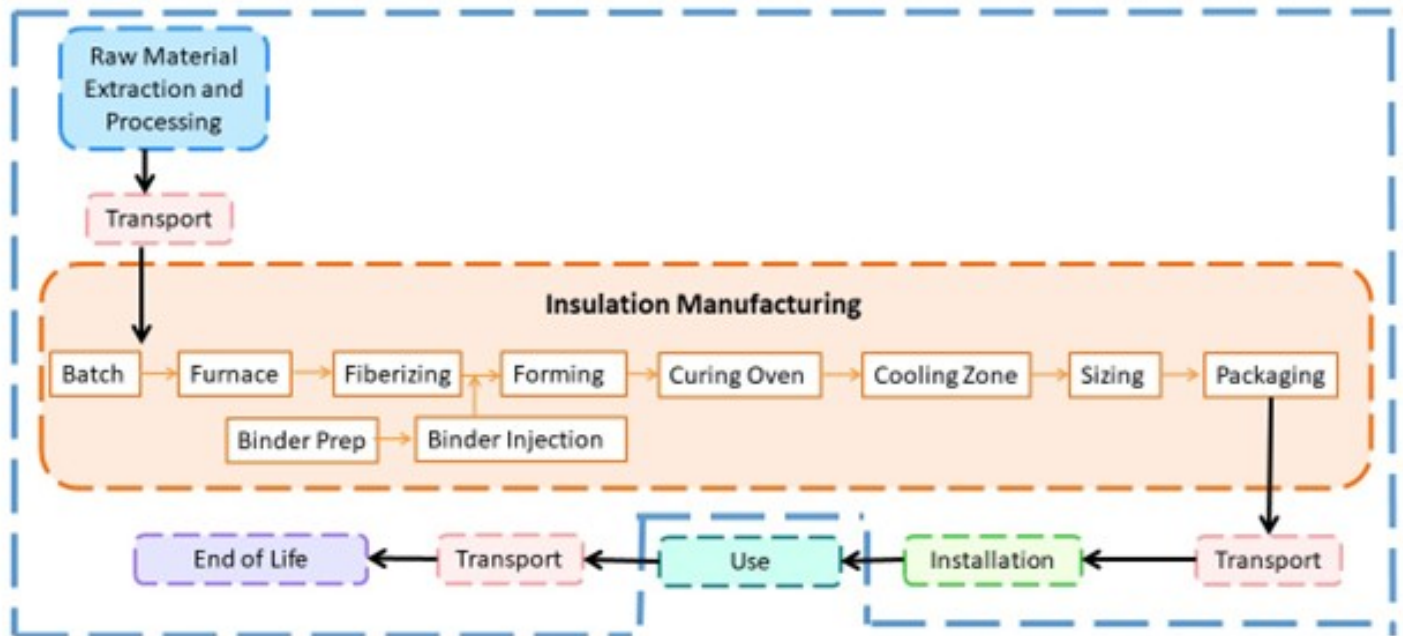
Renewable Electricity

Renewable electricity is used: No

System Boundary

| | | | |
|---|----|-------------------------------------|----|
| Production | A1 | Raw material supply | ✓ |
| | A2 | Transport | ✓ |
| | A3 | Manufacturing | ✓ |
| Construction | A4 | Transport to site | ✓ |
| | A5 | Assembly / Install | ✓ |
| Use | B1 | Use | ND |
| | B2 | Maintenance | ND |
| | B3 | Repair | ND |
| | B4 | Replacement | ND |
| | B5 | Refurbishment | ND |
| | B6 | Operational Energy Use | ND |
| | B7 | Operational Water Use | ND |
| End of Life | C1 | Deconstruction | ✓ |
| | C2 | Transport | ✓ |
| | C3 | Waste Processing | ✓ |
| | C4 | Disposal | ✓ |
| Benefits & Loads Beyond System Boundary | D | Recycling, Reuse Recovery Potential | ND |

Product Flow Diagram



Life Cycle Module Descriptions

This EPD study is characterized as a “cradle-to-gate with options” study, examining the Blanket Insulation product line from the five CertainTeed manufacturing facilities (Ottawa, OT, Redcliff, AB, Kansas City, KS, Athens, GA, Chowchilla, CA) . The production stage encompasses a range of processes, including the extraction and processing of raw materials, the processing of secondary materials, the transportation of raw materials to the manufacturing site, manufacturing and processing, the consumption of materials, energy, and water, the waste and loss rate during the installation of the product in the building, and the disposal of the product at the end of its life. Each of these stages is closely monitored and optimized to ensure maximum efficiency and sustainability.

- Raw Materials and Product Recipe (Modules A1)

A thorough analysis of the material inputs was completed for the inventory of this study. The Blanket Insulation product component percentages. The Blanket Insulation product component percentages for the finished product are included in the study for the combined average product of the five facilities (Athens, GA, Chowchilla, CA, Kansas, KS, Ottawa, ON and Redcliff, AB).

- Raw Material Transportation (Module A2)

Raw materials are transported to the manufacturing sites by standard freight truck, train, or ocean freighters. Unless otherwise noted, transport vehicles are fueled with diesel fuel.

- Manufacturing Process Overview (Module A3)

A detailed analysis of the Blanket Insulation manufacturing process was completed by the Saint-Gobain North American Environmental, Social and Governance (ESG) department to observe and understand the manufacturing processes for Blanket Insulation. A process flow diagram is attached above and illustrates all process steps, inputs, and outputs including material, energy, emissions, and wastes. To produce Blanket insulation, the glass component raw materials are melted and formed into the final product. The binder component raw materials are mixed and injected into the process, after which the product with the combined components is cured, sized, and then packaged.

- Packaging (Module A3)

Packaging of the final product after production is included in the life cycle assessment. The product is stacked in cardboard sleeves, wrapped in shrink wrap, and paper labels affixed. The packages of product in cardboard sleeves are then stacked on a pallet with other finished product and wrapped in shrink wrap again before final

shipping. The purchased amount of packaging material was provided by the facilities personnel and the weight of each material per square foot of finished product was calculated.

- Product Distribution (Module A4)

Final products are transported on trucks throughout the United States and Canada. This study assumed an average of 800 km for the final shipment of product based on the assumption within the Product Category Rule (PCR).

- Installation (Module A5)

Blanket Insulation is made for easy handling and installation . For small or irregularly shaped spaces, all trimming can simply accomplished with a utility knife. For cathedral ceiling , an air space between the insulation and roof sheathing, ventilated at ridge and soffit is desirable

- Use (Modules B1-B7)

The use phase is excluded from the study. The associated results tables will be excluded from the Scenarios Section. Installation (Module A5) Installation of CertainTeed products is accomplished by manual labor and typically does not require any additional materials. If necessary, cutting is done by hand using hand held cutting tools.

- End of life (Modules C1-C4)

The blanket insulation is usually deconstructed and loaded onto a truck or dumpster at the decommissioning of a building. The product was modeled as being disposed of in a landfill. There are currently no end-of-life recycling programs formally established across the industry.

LCA Discussion

Allocation Procedure

Energy and water allocation for both facilities is based on production mass. All facilities produce blanket insulation, however, blanket insulation is not the only product made at each of the facilities. Production of the blanket insulation at all the facilities is based on mass of production. Results were calculated based on a weighted average of the facilities. The manufacturing flow data was combined with resource extraction, processing, transportation, installation, use, and deposition to landfill.

Cut-off Procedure

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances – as defined by the U.S. Occupational Health and Safety Act the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No known flows were deliberately excluded. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration..

Data Quality Discussion

For the data used in this EPD, the data quality is considered to be of good to high quality. The data and datasets cover all relevant process steps and technologies over the supply chain of the represented Blanket insulation products. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. Since the inventory flows for the utilized databases are very often accompanied by a series of data quality ratings, a general indication of precision can be inferred. Using these ratings, the data sets used generally have medium-to-high precision. The Saint-Gobain North American ESG Department collected specific data on energy and material inputs, wastes, water use, emissions, and transportation impacts from the five CertainTeed manufacturing facilities (Ottawa, OT, Redcliff, AB, Kansas City, KS, Athens, GA, Chowchilla, CA).

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1

per 1 m2 of material with RSI = 1m2K/W.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

| Impact Category | Method | Unit | A1A2A3 | A4 | A5 | C1 | C2 | C3 | C4 |
|-----------------|------------------|--------------|---------|----------|----------|----|----------|----|----------|
| GWP-total | IPCC AR5 GWP 100 | kg CO2 eq | 9.38e-1 | 4.62e-2 | 8.90e-2 | 0 | 6.09e-4 | 0 | 9.03e-3 |
| ODP | TRACI 2.1 | kg CFC 11 eq | 6.28e-7 | 1.78e-12 | 4.57e-16 | 0 | 2.34e-14 | 0 | 4.57e-16 |
| AP | TRACI 2.1 | kg SO2 eq | 2.46e-3 | 2.82e-4 | 9.70e-4 | 0 | 3.71e-6 | 0 | 4.93e-5 |
| EP | TRACI 2.1 | kg N eq | 8.97e-4 | 1.56e-5 | 3.46e-4 | 0 | 2.06e-7 | 0 | 2.16e-6 |
| POCP | TRACI 2.1 | kg O3 eq | 5.33e-4 | 7.17e-6 | 1.40e-5 | 0 | 9.44e-8 | 0 | 3.80e-6 |
| ADP-fossil | TRACI 2.1 | MJ | 1.55e+0 | 8.30e-2 | 1.87e-2 | 0 | 1.09e-3 | 0 | 1.87e-2 |
| GWP-fossil | TRACI 2.1 | kg CO2 eq | 9.84e-1 | 4.69e-2 | 1.47e-1 | 0 | 6.18e-4 | 0 | 9.32e-3 |

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m2 of material with RSI = 1m2K/W.

| Indicator | Unit | A1A2A3 | A4 | A5 | C1 | C2 | C3 | C4 |
|-----------|------|---------|---------|---------|----|---------|----|---------|
| RPRE | MJ | 4.16e+0 | 0 | 1.74e-2 | 0 | 0 | 0 | 1.74e-2 |
| RPRM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | ND |
| RPRT | MJ | 4.16e+0 | 0 | 1.74e-2 | 0 | 0 | 0 | 1.74e-2 |
| NRPRE | MJ | 1.55e+1 | 3.02e-1 | 7.44e-2 | 0 | 7.96e-3 | 0 | 1.49e-1 |
| NRPRM | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRPRT | MJ | 1.55e+1 | 3.02e-1 | 7.44e-2 | 0 | 7.96e-3 | 0 | 1.49e-1 |
| SM | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NRSF | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RE | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FW | m3 | 1.25e-2 | 0 | 4.02e-5 | 0 | 0 | 0 | 1.84e-5 |

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM: Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of material with RSI = 1m2K/W.

| Indicator | Unit | A1A2A3 | A4 | A5 | C1 | C2 | C3 | C4 |
|-----------|------|-----------|----|----------|----|----|----|----------|
| HWD | kg | -9.01e-11 | 0 | 9.83e-12 | 0 | 0 | 0 | 3.71e-12 |
| NHWD | kg | 4.67e-1 | 0 | 4.26e-6 | 0 | 0 | 0 | 4.45e-1 |
| RWD | kg | 5.84e-4 | 0 | 1.10e-7 | 0 | 0 | 0 | 1.65e-6 |
| HLRW | kg | 6.96e-7 | 0 | 1.84e-9 | 0 | 0 | 0 | 1.84e-9 |
| HLRW | kg | 5.81e-4 | 0 | 1.65e-6 | 0 | 0 | 0 | 1.65e-6 |

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of material with RSI = 1m2K/W.

| Indicator | Unit | A1A2A3 | A4 | A5 | C1 | C2 | C3 | C4 |
|-----------|--------|--------|----|----|----|----|----|----|
| BCRP | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| BCEP | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| BCRK | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| BCEK | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| BCEW | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| CCE | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| CCR | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |
| CWNR | kg CO2 | 0 | ND | ND | ND | ND | ND | ND |

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Impact Scaling Factors

| Metal Building Insulation | Product R-Value | Thickness (inches) | Density (lb/cu ft) | Scaling Factor |
|---------------------------|-----------------|--------------------|--------------------|----------------|
| Pseudo product for RSI=1 | R,5.68 | 0.049 | 0.57 | 1.00E+00 |
| Metal Building Insulation | R-10 | 3.38 | 0.57 | 1.76E+00 |
| Metal Building Insulation | R-11 | 3.25 | 0.59 | 2.01E+00 |
| Metal Building Insulation | R-13 | 4.38 | 0.65 | 2.58E+00 |
| Metal Building Insulation | R-19 | 6.38 | 0.60 | 3.49E+00 |
| Metal Building Insulation | R-25 | 8.00 | 0.69 | 5.03E+00 |
| ND | R-30 | 9.25 | 0.71 | 6.02E+00 |

| Metal Building Insulation Filler Blanket | Product R-Value | Thickness (inches) | Density (lb/cu ft) | Scaling Factor |
|--|-----------------|--------------------|--------------------|----------------|
| Metal Building Insulation Filler Blanket | R-13 | 4.38 | 0.69 | 2.74E+00 |
| Metal Building Insulation Filler Blanket | R-25 | 8.00 | 0.61 | 4.44E+00 |
| Metal Building Insulation Filler Blanket | R-30 | 10.00 | 0.48 | 4.39E+00 |

| Canada Sustainable Metal Building Insulation | Product R-Value | Thickness (inches) | Density (lb/cu ft) | Scaling Factor |
|--|-----------------|--------------------|--------------------|----------------|
| Canada Sustainable Metal Building Insulation | R-10 | 3.38 | 0.66 | 2.03E+00 |
| Canada Sustainable Metal Building Insulation | R-11 | 3.25 | 0.65 | 1.93E+00 |
| Canada Sustainable Metal Building Insulation | R-13 | 4.38 | 0.73 | 2.92E+00 |
| Canada Sustainable Metal Building Insulation | R16 | 5.25 | 0.60 | 2.87E+00 |
| Canada Sustainable Metal Building Insulation | R-19 | 6.38 | 0.68 | 3.96E+00 |
| Canada Sustainable Metal Building Insulation | R-21 | 6.25 | 0.68 | 3.88E+00 |
| Canada Sustainable Metal Building Insulation | R-25 | 8.00 | 0.71 | 5.18E+00 |
| Canada Sustainable Metal Building Insulation | R-30 | 9.25 | 0.66 | 5.57E+00 |

| Standard Universal Blanket Impacts | Type | Product R-Value | Thickness (inches) | Density (lb/cu ft) | Scaling Factor |
|------------------------------------|-----------|-----------------|--------------------|--------------------|----------------|
| Standard Universal Blanket Impacts | Type 501 | R-4.7 | 1.50 | 0.6 | 8.18E-01 |
| Standard Universal Blanket Impacts | Type 501 | R-6.3 | 2.00 | 0.6 | 1.10E+00 |
| Standard Universal Blanket Impacts | Type 501 | R-9.3 | 3.00 | 0.6 | 1.64E+00 |
| Standard Universal Blanket Impacts | Type 501 | R-12.5 | 4.00 | 0.6 | 2.20E+00 |
| Standard Universal Blanket Impacts | Type 751 | R-5.2 | 1.50 | 0.75 | 1.02E+00 |
| Standard Universal Blanket Impacts | Type 751 | R-6.9 | 2.00 | 0.75 | 1.37E+00 |
| Standard Universal Blanket Impacts | Type 751 | R-10.3 | 3.00 | 0.75 | 2.04E+00 |
| Standard Universal Blanket Impacts | Type 751 | R-13.8 | 4.00 | 0.75 | 2.74E+00 |
| Standard Universal Blanket Impacts | Type 1001 | R-3.8 | 1.00 | 1.00 | 8.97E-01 |
| Standard Universal Blanket Impacts | Type 1001 | R-5.8 | 1.50 | 1.00 | 1.36E+00 |
| Standard Universal Blanket Impacts | Type 1001 | R-7.7 | 2.00 | 1.00 | 1.83E+00 |
| Standard Universal Blanket Impacts | Type 1001 | R-11.5 | 3.00 | 1.00 | 2.73E+00 |
| Standard Universal Blanket Impacts | Type 1001 | R-15.4 | 4.00 | 1.00 | 3.66E+00 |
| Standard Universal Blanket Impacts | Type 1501 | R-4.2 | 1.00 | 1.50 | 1.35E+00 |
| Standard Universal Blanket Impacts | Type 1501 | R-6.3 | 1.50 | 1.50 | 2.04E+00 |
| ND | Type 2001 | R-4.3 | 1.00 | 2.00 | 1.79E+00 |

| High Temperature Blanket | Type | Thickness (inches) | Density (lb/cu ft) | Scaling Factor |
|--------------------------|--------|--------------------|--------------------|----------------|
| High Temperature Blanket | Type 1 | 2.00 | 1.25 | 1.20E+00 |
| High Temperature Blanket | Type 2 | 2.00 | 2.50 | 1.98E+00 |

The scaling factors, shown above are based on the density of the product per area of the Blanket Insulation produced from the five CertainTeed manufacturing facilities (Ottawa, OT, Redcliff, AB, Kansas City, KS, Athens, GA, Chowchilla, CA). To determine the impacts for various R-values, the environmental impacts presented in this report can be multiplied by the above scaling factors to determine the impacts per square meter. R-10 MBI is used as a reference product (density) to calculate the pseudo product for RSI =1 that would be thinner with the same density to produce an R-value of 5.68 and an RSI=1 for the declared unit. The proportion of insulation and resin is consistent across all product lines included.

Scenarios

Transport to the building/construction site (A4)

A4 Module

| | |
|--|--|
| Fuel Type: | Diesel |
| Liters of Fuel: | 30 l/100km |
| Vehicle Type: | Standard Freight Trailer |
| Transport Distance: | 1140 km |
| Capacity Utilization: | 85 % |
| Gross density of products transported: | 9.13 kg/m ³ |
| Weight of products transported: | 0.445 kg |
| Capacity utilization volume factor: | <1 |
| Assumptions for scenario development: | Raw materials are transported to the manufacturing sites by standard freight truck, train, or ocean freighters. Unless otherwise noted, transport vehicles are fueled with diesel fuel |

Installation in to the building/construction site (A5)

A5 Module

| | |
|--|---|
| Mass of Packaging Waste Specified by Type: | 0.0024 kg |
| Assumptions for scenario development: | This study assumes no scrap generated from the installation of the product since contractors typically use scrap pieces to fill gaps, leaving very little to no waste from the installation. In addition, disposal of the packaging material is included in the installation phase. |

End of Life

C1 - C4 Modules

Collection Process

| | |
|--|----------|
| Collected with Mixed Construction Waste: | 0.445 kg |
|--|----------|

Disposal

| | |
|---|----------|
| Product or Material for Final Disposal: | 0.445 kg |
|---|----------|

Assumptions for scenario development:

The blanket insulation is usually deconstructed and loaded onto a truck or dumpster at the decommissioning of a building, therefore, this study assumes the deconstruction module of the end-of-life stage to be burden free. The product's end-of-life is assumed to be inert in a landfill. At this time there are no recycling scenarios for the blanket insulation at the end of its service life, so the waste processing module (C3) of the end-of-life stage is also assumed to be burden free. Disposal in a municipal landfill or in commercial incineration facilities is permissible and should be done in accordance with local, provincial, and federal regulations.

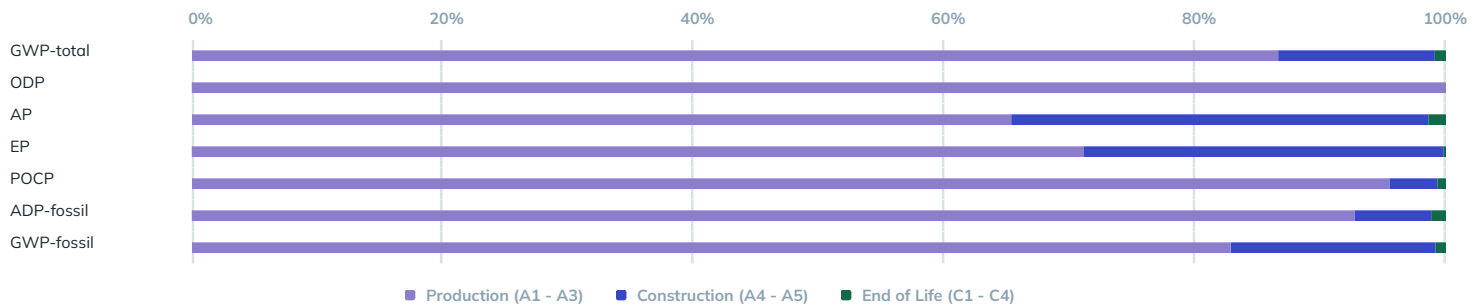
Interpretation

This study was conducted in adherence to ISO standards and best practices, and aimed to facilitate an in-depth understanding of the life cycle impacts of blanket insulation for internal use. All data pertaining to the operations of the five manufacturing locations, transportation distances, and modes of transportation were collected

directly from CertainTeed. The collected data was then cross-checked for internal consistency, and verified with plant personnel. It is recommended that sub-metering of energy use be implemented at each critical stage of the manufacturing process to enable more detailed analysis. It is worth noting that the findings of this research are limited by the inherent uncertainty of creating a representative model through LCA. The modeling of the product system was based on representative processes and datasets, resulting in several assumptions. While quality control was undertaken at every step of building the LCI and conducting the LCIA, the results are not conclusive due to the fact that the data represents only one year of manufacturing information from five manufacturing locations. As such, detailed evaluation of more manufacturing plants and time periods would reduce the uncertainty. It is important to note that some level of uncertainty is inevitable while conducting LCA, and decision making must reflect this fact.

Based on the results from the life cycle assessment, the life cycle impacts are strongly driven by the manufacturing process. This may be driven by the increased use of electricity and potential process inefficiencies. Increasing energy efficiency would help to reduce the overall environmental impacts for all sites. Additionally, the energy-intensive processes involved, often relying on conventional grid electricity, can result in elevated carbon emissions and other environmental burdens. Therefore, a strategy to mitigate a small portion of this impact that cannot be reduced entirely by efficiency could be to install onsite renewables such as onsite solar panels. Offsite renewable energy may be considered a solution depending on future reporting standards. Raw materials play a pivotal role in determining the environmental impact of blanket insulation. Opting for materials with lower energy requirements and reduced environmental burdens, while maintaining insulation performance, can significantly contribute to the overall sustainability of the product. Moreover, identifying alternate uses or recycling options for the product at the end of its useful life will reduce the end-of-life and potential raw materials burdens of recycled product.

If possible, incorporating more recycled content (post-consumer cullet) into the product will help reduce the environmental impacts of the raw materials stage in the life cycle of the product. As recycled content increases, the impacts will decrease, thus improving the overall environmental impacts. Soda Ash and Borax are the largest contributors to the raw material impacts for the product, responsible for up to 72% of the global warming potential impacts to produce the glass fiber. Increasing the recycled content as mentioned above, will help decrease the usage of these larger contributors to the impacts.



Additional Environmental Information

- Environment and Health During Manufacturing

CertainTeed has well-established Environmental, Health, and Safety (EHS) and product stewardship programs which help to enforce proper evaluation and monitoring of chemicals that are chosen to manufacture products. These programs ensure that all environmental and OSHA requirements are met or exceeded to ensure the health and safety of all employees and contractors.

- Environment and Health During Installation

Fiberglass insulation may cause temporary skin and respiratory irritation. During installation it is recommended that eye protection, disposable dust masks, gloves, hats, long sleeves and long pants are worn.

Installation has minimal impacts due to the modular nature of insulation and minimal energy required for installation. The assumption is that insulation require no cleaning or maintenance so use phase impacts are zero

Modified Impact Results: Renewable Electricity

per 1 m2 of material with RSI = 1m2K/W.

| Impact Category | Indicator | Unit | A1A2A3 | A4 | A5 | C1 | C2 | C3 | C4 |
|-----------------|-----------|--------------|---------|----------|----------|----|----------|----|----------|
| GWP-total | ND | kg CO2 eq | 8.05e-1 | 4.62e-2 | 8.90e-2 | 0 | 6.09e-4 | 0 | 9.03e-3 |
| ODP | ND | kg CFC 11 eq | 6.28e-7 | 1.78e-12 | 4.57e-16 | 0 | 2.34e-14 | 0 | 4.57e-16 |
| AP | ND | kg SO2 eq | 2.22e-3 | 2.82e-4 | 9.70e-4 | 0 | 3.71e-6 | 0 | 4.93e-5 |
| EP | ND | kg N eq | 8.80e-4 | 1.56e-5 | 3.46e-4 | 0 | 2.06e-7 | 0 | 2.16e-6 |
| POCP | ND | kg O3 eq | 5.23e-4 | 7.17e-6 | 1.40e-5 | 0 | 9.44e-8 | 0 | 3.80e-6 |
| ADP-fossil | ND | MJ | 1.40e+0 | 8.30e-2 | 1.87e-2 | 0 | 1.09e-3 | 0 | 1.87e-2 |
| GWP-fossil | ND | kg CO2 eq | 8.44e-1 | 4.69e-2 | 1.47e-1 | 0 | 6.18e-4 | 0 | 9.32e-3 |

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Saint-Gobain is committed to achieving Carbon Neutrality by 2050. In January 2021, Saint-Gobain North America started receiving renewable energy certificates (RECs) from a 12-year virtual power purchase agreement (vPPA) with the Blooming Grove Wind Farm in McLean County, Illinois. Each year within the agreement, the company receives and retires these RECs, effectively reduced approximately 35.2% of CO2 emissions from electricity usage in 2022 in the United States and Canada. Updated results reflecting the RECs in the electricity input in manufacturing (A3) are shown below.

References

- Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 4. March 2022. UL Environment.
- Product Category Rule Guidance for Building-Related Products and Services: Part B – Building Envelope Thermal Insulation EPD Requirements, UL 10010-1. Edition 3.0, dated April 2023
- ISO 14040: 2006 Series – Environmental Management-Life Cycle Assessment
- ISO 21930:2017– Sustainability in building construction – Environmental declaration of building products
- Sphera LCA FE Databases. <https://gabi.com/america/>
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- CertainTeed Insulation Websites. <https://www.certainteed.com/building-insulation/products/> and <https://www.certainteed.com/technical-insulation/products/>
- Provincial and Territorial Energy Profiles – Ontario . <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-ontario.html>
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