

Program Operator: Smart EPD®
www.smartepd.com



SmartEPD-2024-025-0134-01

InsulPure Building Insulation

Date of Issue

Aug 20, 2024

Expiration date

Aug 20, 2029

Last updated

Aug 28, 2024

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information	4
Organization Information	4
Limitations, Liability, and Ownership	4
Reference Standards	4
Verification Information	5
Product Description	5
Product Specifications	6
Material Composition	6
EPD Representativeness	7
EPD Data Specificity	7
System Boundary	8
Plants	8
Product Flow Diagram	9
Software, Data Sources and Data Quality	9
Software and Database	9
Data Quality	9
Life Cycle Module Descriptions	10
LCA Discussion	10
Allocation Procedure	10
Cut-Off Procedure	10
Renewable Electricity	10
Scenarios	10
Transport to the building/construction site (A4)	10
Installation in to the building/construction site (A5)	11
End of Life (C1 - C4)	11
Results	12

Environmental Impact Assessment	12
Resource Use Indicators	12
Waste and output Flow Indicators	13
Carbon Emissions and Removals	13
Impact Scaling Factors	14
Interpretation	14
Additional Environmental Information	15
Further Information	16
References	17

General Information

CertainTeed

20 Moores Rd, Malvern, PA 19355

8002338990

sustainability@saint-gobain.com [certainteed.com](https://www.certainteed.com)



Product Name:	InsulPure Building Insulation
Functional Unit:	1 m2 of material with RSI = 1m2K/W
Declaration Number:	SmartEPD-2024-025-0134-01
Date of Issue:	August 20, 2024
Expiration:	August 20, 2029
Last updated:	August 28, 2024
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4
Market(s) of Applicability:	North America

Organization Information

With innovative building solutions made possible through its comprehensive offering of interior and exterior products, CertainTeed is transforming how the industry builds. As leaders in building science and sustainable construction, CertainTeed makes it easier than ever to create high-performance, energy-efficient places to live, work and play, so that together we can make the world a better home.

A subsidiary of Saint-Gobain, one of the world's largest and oldest building products companies, CertainTeed has more than 6,900 employees and more than 60 manufacturing facilities throughout the United States and Canada.

Further information can be found at: www.certainteed.com

Limitations, Liability, and Ownership

This EPD was not written to support comparative assertions. Even for similar products, differences in declared unit, use and end-of-life stage assumptions, and data quality may produce incomparable results. It is not recommended to compare EPDs with another organization, as there may be differences in methodology, assumptions, allocation methods, data quality such as variability in data sets, and results of variability in assessment software tools used. 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.

Reference Standards

Standard(s): ISO 14025 and ISO 21930:2017

Core PCR:	PCR for Building-Related Products and Services Part A Date of issue: March 01, 2022
Sub-category PCR:	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:  Cher Xue  TrueNorth Collective  cher.xue@truenorthcollective.net Independent external verification of EPD, according to ISO 14025 and reference PCR(s):  Cher Xue  TrueNorth Collective  cher.xue@truenorthcollective.net

External

External

Product Information

Functional Unit:	1 m2 of material with RSI = 1m2K/W
Mass:	1.36 kg
Reference Service Life:	75 Years
Product Specificity:	 Product Average  Product Specific

Product Description

Product Identification

InsulPure Building Insulation is an easy, cost-effective method to help conserve energy in residential and commercial new construction, remodeling and re-insulation projects. Fiberglass Building Insulation is intended for use in either residential or commercial construction as thermal and acoustical insulation in ceilings, walls and floors. InsulPure Building Insulation is composed of white uniformly textured, inorganic fibrous glass and formed with a formaldehyde-free binding agent. InsulPure Building Insulation is available Faced (Kraft) or Unfaced.

Product Specification

- InsulPure Building Insulation® brings you long-lasting comfort through thermal performance, reduced noise levels and exceeds California's strict Indoor Air Quality Requirements, all the while saving 12 times as much energy in its first year as the energy used to produce it. Plus, it will last for the life of the building as it won't settle, accumulate moisture or lose its R-value over time.
- Renewable. Recycled. Plant Based.
oCertainTeed InsulPure Building Insulation is made of fiberglass that consists of rapidly renewable content, a high percentage of recycled glass, and a new plant-based binder that has no formaldehyde, harsh acrylics, dyes or unnecessary fire retardants added.

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

Product Specifications

Product Classification Codes:	UNSPSC - 30141500 Masterformat - 072100- Thermal Insulation EC3 - ThermalMoistureProtection -> Insulation -> BlanketInsulation EC3 - MechanicalInsulation
Form Factor:	ThermalMoistureProtection >> Insulation >> BlanketInsulation
Insulation type:	Fiberglass
Compressive Strength:	160 mm
Density:	8.5 kg/m ³
Thermal conductivity:	19 W/mK
Thickness for R value of 1:	6.25 mm
Intended Application:	Wall & General
Thermal resistance:	3.3 m ² K/W

Material Composition

Material/Component Category	Origin	% Mass
Sand	Undisclosed	20 - 30
Limestone	Undisclosed	1 - 5
Dolomite	Undisclosed	1 - 5
Cullet	Undisclosed	15 - 25
Recycled Cullet	Undisclosed	15 - 25
Borax	Undisclosed	5 - 15
Soda ash	Undisclosed	5 - 10
Feldspar	Undisclosed	1 - 5
Additional Materials	Undisclosed	0.1 - 1
Binder	Undisclosed	1 - 10

Packaging Material	Origin	kg Mass
Paper label	Undisclosed	0.0000594
Bags	Undisclosed	0.0104
Woven Sleeves	Undisclosed	0.0059



Biogenic Carbon Content	kg C per m2 of material with RSI = 1m2K/W
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.00000368

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

EPD Data Specificity

- Primary Data Year:2021-2022
- Manufacturing Specificity:

✗

Industry Average

✓

Manufacturer Average

✗

Facility Specific

Averaging:

All flows to and from the environment within the system boundary are normalized to a unit summarizing the function of the system. The environmental impact potentials per functional unit are the basis for comparison in an LCA. It provides a unit of analysis and comparison for all environmental impacts. The declared unit for the study is 1 m² of insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W. The building insulation products are made in Athens, GA and Kansas City, KS. However, there are additional products produced at this location that were excluded from the study. Allocation was conducted based on the production mass data provided by the two facilities. A weighted average was performed to represent a product average for raw materials, raw material transportation, and manufacturing processes between the two facilities.

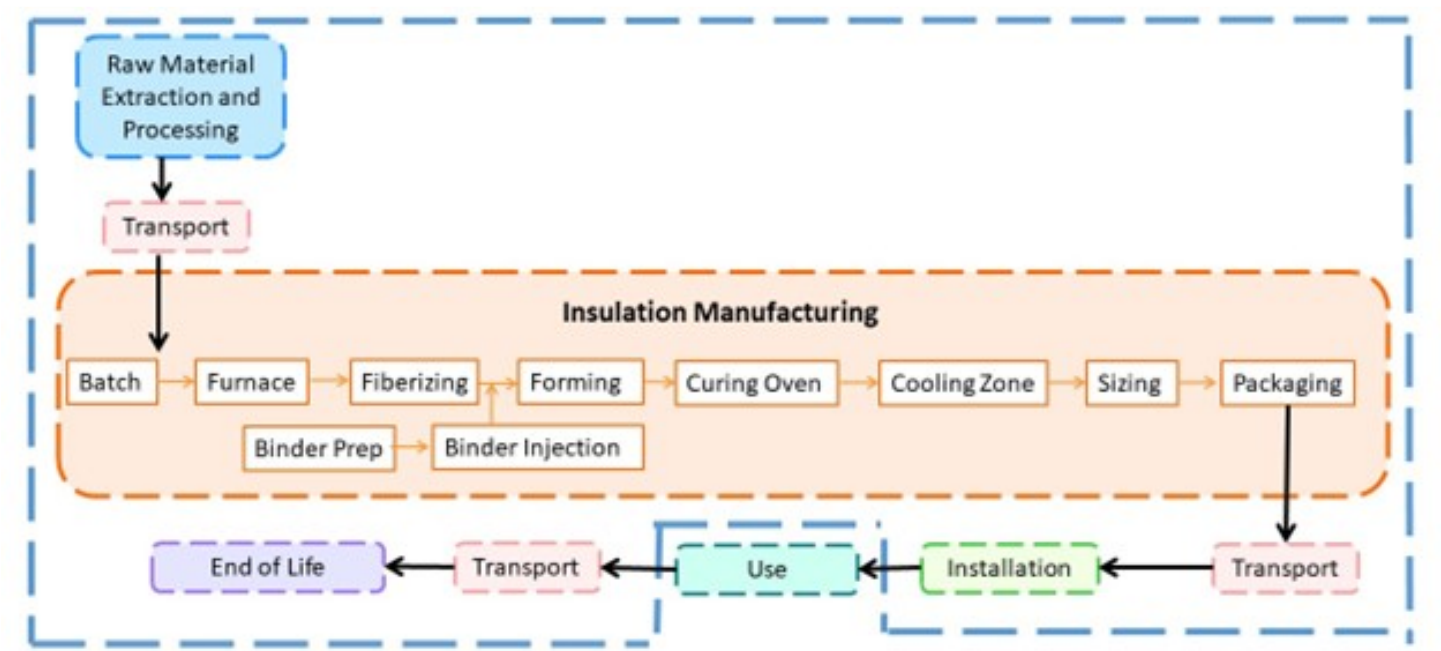
System Boundary

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

Plants

-  CertainTeed Interior Products Group (Athens, GA)
425 Athena Dr, Athens, GA 30601, USA
-  CertainTeed Interior Products Group (Kansas City, KS)
103 Funston Rd, Kansas City, KS 66115, USA
-  CertainTeed Interior Products Group (Kansas City, KS)
103 Funston Rd, Kansas City, KS 66115, USA
-  CertainTeed Interior Products Group (Kansas City, KS)
103 Funston Rd, Kansas City, KS 66115, USA

Product Flow Diagram



Software and Database

LCA Software:	 LCA for Experts v. 10.7
LCI Foreground Database(s):	 GaBi Professional Database v. 2022
LCI Background Database(s):	 US LCI v. undefined  Ecoinvent v. 3.9  GaBi Professional Database v. 2022

Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. The data sources used are complete and representative of North America in terms of the geographic and technological coverage and are less than ten years old. Any deviations from these initial data quality requirements for secondary data are documented in the report. The results of an LCA are only as good as the quality of input data used. Important data quality factors include precision (measured, calculated, or estimated), completeness, consistency, and reproducibility. The data used for primary data are based on direct information sources from the CertainTeed facilities. The energy and water usage data were collected directly from the utility meters, and the allocation was based on the analysis of experts at the plant. Therefore, the precision for primary data is considered high; however, the uncertainty of the primary data has not been quantified.

Secondary data sets were used for raw materials extraction and processing, transportation, and energy production flows. Primary data was collected from the CertainTeed experts as tracked by automated systems and records. Since most of the data is annually reported, the consistency is considered high. Secondary data was consistently modeled using primarily the Sphera LCA FE database with inputs from the USLCI and Ecoinvent v3.9 when data was not available in the Sphera LCA FE database. Proxies were only identified and used if secondary data was not available. This methodology provides consistency throughout the model. The representativeness of the datasets is chosen to be representative of North America, average technologies of the major producers and distributors of recent and modern timeframes. Most of the secondary data sets have some uncertainty information documented and varies per model. Uncertainty for primary data was not quantified. However, the collected data and allocation methodologies were judged by the operations personnel to be accurate, so the uncertainty is considered low. Overall, the primary data from the manufacturing location is of very high quality, being directly tracked and measured by facility personnel. Therefore, the secondary data is likely to have a higher degree of uncertainty than the primary production data. This is considered when interpreting the results of this life cycle assessment.

Life Cycle Module Descriptions

A thorough analysis of the material inputs was completed for the inventory of this study. No substances required to be reported as hazardous or dangerous are associated with the production of this product. 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. A detailed analysis of the InsulPure Duct Wrap and InsulPure Building Insulation Batt manufacturing process was completed by the Saint-Gobain North American ESG Department.

A process flow diagram is attached and illustrates all process steps, inputs, and outputs including material, energy, emissions, and wastes. To produce duct wrap insulation and batt 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, facing is applied if specified, sized, and then packaged. Energy, water and materials go into the duct wrap insulation process and waste and emissions are outputs from the manufacturing process. Energy, water, and materials go into the InsulPure Duct Wrap and InsulPure Building Insulation Batt process and waste and emissions are outputs from the manufacturing process.

LCA Discussion

Allocation Procedure

Allocation was conducted based on the production mass data provided by the facilities as a percentage of the overall production mass. Since the plant does not have submetering, there is no way to determine exact consumption for specific product lines. Mass allocation is the most accurate and representative way to allocate energy and water usage data. No waste flows during production have been allocated as co-products. Emissions associated with land use change were not included in the LCA due to the negligible impacts. The building insulation products are made in Athens, GA and Kansas City, KS. However, there are additional products produced at this location that were excluded from the study. Allocation was conducted based on the production mass data provided by the two facilities. A weighted average was performed to represent a product average for raw materials, raw material transportation, and manufacturing processes between the two facilities.

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.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:

✗ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Standard Freight Trailer
Transport Distance:	1740 km
Capacity Utilization:	85 %
Packaging Mass:	0.0164 kg
Gross density of products transported:	8.49 kg/m ³
Weight of products transported:	1.36 kg
Capacity utilization volume factor:	<1
Assumptions for scenario development:	Final products are transported on trucks throughout North America. This study assumed an average of 1740 km for the final shipment of product.

Installation in to the building/construction site (A5)

A5 Module

Waste Materials at the Construction Site Before Waste Processing:	0.0164 kg
Mass of Packaging Waste Specified by Type:	0.0164 kg
Biogenic Carbon Contained in Packaging:	0.00000368 kg
Assumptions for scenario development:	InsulPure Duct Wrap is installed by wrapping the insulation around the perimeter of the duct with the facing out. Adjacent sections of duct wrap are tightly butted with the 2" taping flap overlapping. The overlapping does not lead to product loss. Seams must be stapled with outward-clinching staples on approximately 6" centers. When a vapor retarder is required, all seams, joints, tears, punctures and/or other penetrations of the duct wrap must be sealed with a pressure-sensitive vapor retarder tape that matches the facing, or a suitable mastic system. InsulPure Building Insulation is an easy, cost-effective method to help conserve energy in residential and commercial new construction, remodeling and re-insulation projects. InsulPure Building Insulation can be installed in wood or metal framing, in-between studs, ceiling joists, floor joists and cathedral ceiling applications. Fiberglass insulation can be installed as friction fit into the cavities or installed using the staple flap for faced insulation products. Building Insulation is intended for use in either residential or commercial construction as thermal and acoustical insulation in ceilings, walls, and floors. Waste materials at the construction site before waste processing, generated by product installation only includes packaging waste. There is no product loss by insulation installation.

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected Separately:	0.0408 kg
------------------------------	-----------

Recovery

Landfill:	0.0408 kg
------------------	-----------

Disposal

Product or Material for Final Disposal:	0.0408 kg
--	-----------

Assumptions for scenario development:

Deconstruction by hand, disposal inert in landfill transported by truck.

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1

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

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

Unfaced Batts

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
GWP-total [including bio-genic carbon]	IPCC AR5 GWP 100	kg CO2 eq	9.46e-1	6.51e-2	4.09e-3	0	4.00e-4	0	1.17e-2
GWP-total [including bio-genic carbon]	TRACI 2.1	kg CO2 eq	9.58e-1	6.38e-2	2.58e-3	0	3.76e-4	0	1.31e-2
ODP	TRACI 2.1	kg CFC 11 eq	3.41e-7	2.48e-12	1.42e-14	0	1.42e-14	0	6.43e-16
AP	TRACI 2.1	kg SO2 eq	1.55e-3	3.93e-4	1.68e-5	0	2.26e-6	0	6.94e-5
EP	TRACI 2.1	kg N eq	9.33e-4	2.18e-5	5.31e-6	0	1.25e-7	0	3.04e-6
POCP	TRACI 2.1	kg O3 eq	2.63e-2	1.08e-2	9.98e-5	0	6.22e-5	0	1.26e-3
ADP-fossil	TRACI 2.1	MJ	1.83e+0	1.13e-1	9.46e-4	0	6.66e-4	0	2.63e-2

Note:
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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.

Global Warming Potential or Climate Change is an indicator aimed at including in a single value the added effect of all the substances contributing to the greenhouse effect. Global Warming Potential (GWP-total) includes biogenic carbon, fossil carbon, land use, and land use change. To calculate GWP-total within the above table, the equation below is used: $GWP\text{-total} = GWP\text{-biogenic} + GWP\text{-fossil} + GWP\text{-luluc}$

- GWP-total or GWPtotal (including biogenic) is the sum of GWP-biogenic, GWP-fossil, and GWP-luluc.
- GWP-biogenic only includes biogenic carbon, which is carbon that is stored in bio-sourced materials, like plants, trees, and soil. This excludes fossil.
- GWP-fossil or GWPtotal (excluding biogenic) only includes fossil carbon, which is the carbon dioxide emitted when fossil fuels like coal, oil, or natural gas are combusted. This excludes biogenic.
- GWP-luluc only includes the greenhouse gas emissions that arise in connection with changes in the specified carbon stock as a result of land use and land use change, such as deforestation.

Depending on the required or optional standards, GWP can be reported with different methods and indicators, including United States Environmental Tool for Reduction and Assessment of Chemicals and Other Environmental Impacts (TRACI 2.1, etc.), Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR5, AR6, etc.), Environmental Footprint (EF 3.0, 3.1), and/or EN 15804. GWP can be reported on a time frame such as GWP 100 for a 100-year time horizon.

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 of product .

Unfaced Batts

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
PERE	MJ	9.93e-1	0	2.61e-4	0	0	0	2.45e-2
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	9.93e-1	0	2.61e-4	0	0	0	2.45e-2
PENRE	MJ	1.51e+1	8.43e-1	7.07e-3	0	4.84e-3	0	2.09e-1
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	1.51e+1	8.43e-1	7.07e-3	0	4.84e-3	0	2.09e-1
SM	kg	4.62e-1	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	-2.39e-3	0	6.02e-7	0	0	0	2.59e-5

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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, NRPRM 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 of product .

Unfaced Batts

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
HWD	kg	2.74e-10	0	5.56e-14	0	0	0	5.22e-12
NHWD	kg	9.80e-3	0	5.78e-3	0	0	0	6.26e-1
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ, LHV	0	0	0	0	0	0	0
EET	MJ, LHV	0	0	0	0	0	0	0
HLRW	kg	3.13e-7	0	2.76e-11	0	0	0	2.59e-9
ILLRW	kg	2.61e-4	0	2.47e-8	0	0	0	2.31e-6

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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 of product .

Unfaced batts

Indicator	Unit	A1A2A3
BCRP	kg CO2	0
BCEP	kg CO2	0
BCRK	kg CO2	-1.23e-6
BCEK	kg CO2	0
BCEW	kg CO2	0
CCE	kg CO2	0
CCR	kg CO2	0
CWNR	kg CO2	0
BCCPA	kg C	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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.

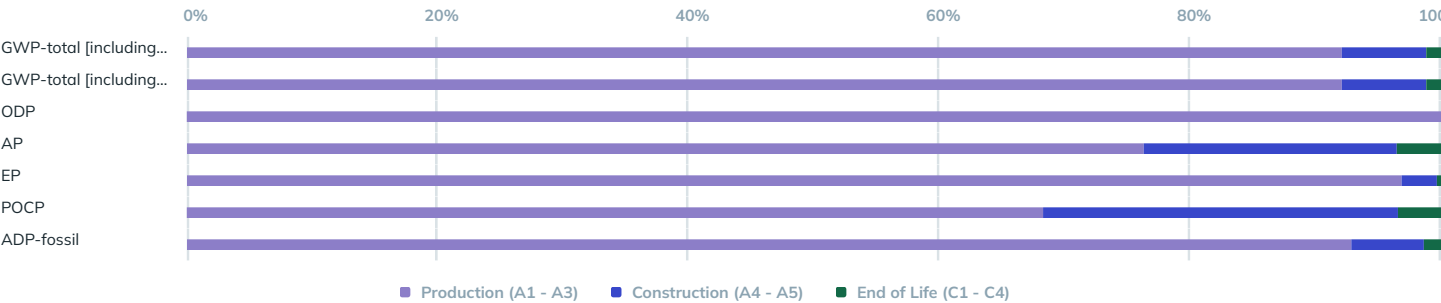
Impact Scaling Factors

Unfaced Batt- Thickness	Uncompressed R-value	RSI	Scaling Factor
1.89 (Pseudo Product)	5.68	1	1.00
3.5	11	1.9	2.08
3.5	13	2.3	2.93
3.5	15	2.6	4.89
6.25	19	3.3	3.30
5.5	21	3.7	4.89
5.5	23	4.1	7.09
8.0	25	4.4	4.64
10.0	30	5.3	5.38
8.25	30C*	5.3	6.36
12.0	38	6.7	6.97
10.25	38C*	6.7	7.14
15.0	49	6.7	7.53

Scaling factors can be used to determine the impacts of the insulation portion of the Batt. The following scaling factors are based on the density of the InsulPure Building Insulation produced in Athens, GA and Kansas City, KS. To determine the impacts, multiply the impact results shown by the scaling factor for a batt product listed. Because the declared unit includes 1m2 of facing but does not change with the density of the insulation portion of the product, the results for the facing will be shown as 1 m2 only with no scaling factor and as separate impacts in the Further Information section. For faced products, multiply the unfaced impact by the appropriate scaling factor for the R-value you are using and then add the impact values for facing from the "Further information" section.

Interpretation

This study was conducted following appropriate ISO standards and best practices and is intended for internal use to assist CertainTeed with understanding the life cycle impacts of their products, as well as having the results published in an EPD. All data for the operation of the manufacturing facilities, as well as transportation distances and modes, was collected directly from CertainTeed. Efforts were made to check the data for internal consistency and to verify data with plant personnel. Sub-metering of energy use for each critical stage in the manufacturing process would allow for more detailed analysis and is recommended. The findings in this research are limited by the inherent uncertainty of creating a representative model through LCA. Many assumptions were made in the modeling of the product system with representative processes and datasets. While quality control was undertaken at each step in building the LCI and conducting the LCIA, uncertainty is present in the results since the data represents only one year of manufacturing information from manufacturing location. Detailed evaluation of more manufacturing plants and time periods would reduce the uncertainty. Some level of uncertainty is inherent in 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 and the raw materials. In addition, when considering the impacts of the product with facing material added, the impacts of the facing are significant. Increasing energy efficiency would help to reduce the overall environmental impacts. 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 into the product will help reduce the environmental impacts of the raw materials stage in the life cycle of the product. Borax and soda ash are the largest contributors to the raw material impacts for the products, responsible for over 50% of the environmental impact potentials in several categories. The citric acid is also a consistent contributor to the raw material environmental impact potentials, responsible for around 15% of the impacts depending on the category. Increasing the recycled content as mentioned above, will help decrease the usage of these larger contributors to the impacts.



Additional Environmental Information

This information can prepare CertainTeed for future sustainable supply chain requirements and can form the basis of marketing literature focused on environmental benefits. This LCA will also assist CertainTeed with evaluating any environmental claims made by competitors. CertainTeed should use the LCA study for evaluating alternate raw materials, source locations, and recycled content as part of a sustainable product development process, in order to take a leadership position in sustainable product development. CertainTeed should also use this LCA as a basis to meet future requirements for customer sustainable purchasing programs and government requirements. CertainTeed should investigate opportunities to reduce energy consumption in the areas of raw material transportation, final product transportation, and especially manufacturing, as these are areas of the process directly under CertainTeed's control. Reduction in these areas will also provide cost savings and potential competitive advantage to CertainTeed. Additionally, sub-metering of energy and water use in the manufacturing stage would be helpful for better allocation of the energy and water used within the facilities, as well as to measure and benchmark for efficiency opportunity analysis. Recycling options for the InsulPure Duct Wrap products and the InsulPure Building Insulation Batt products at the end of the useful life should be investigated to reduce the impacts at the end-of-life and to potentially increase the recycled content of the product which will then decrease the life impacts of the raw materials stage of the product.

Modified Impact Results: Renewable Electricity

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

Impact Category	Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
GWP-total	ND	kg CO2 eq	8.84e-1	6.64e-2	4.09e-3	0	4.00e-4	0	1.17e-2
ODP	ND	kg CFC 11 eq	2.06e-7	2.48e-12	1.42e-14	0	1.42e-14	0	6.43e-16
AP	ND	kg SO2 eq	1.70e-3	3.93e-4	1.68e-5	0	2.26e-6	0	6.94e-5
EP	ND	kg N eq	9.67e-4	2.18e-5	5.31e-6	0	1.25e-7	0	3.04e-6
POCP	ND	kg O3 eq	2.85e-2	1.08e-2	9.98e-5	0	6.22e-5	0	1.26e-3
ADP-fossil	ND	MJ	1.81e+0	1.16e-1	9.46e-4	0	6.66e-4	0	2.63e-2
GWP-fossil	ND	kg CO2 eq	9.28e-1	6.55e-2	2.58e-3	0	3.76e-4	0	1.31e-2

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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 reducing CO2 equivalent emissions from electricity usage in the United States and Canada.

The updated results incorporate the impact of RECs on the electricity used in the manufacturing process (A3), as shown in the aggregated A1, A2, and A3 data in the 'Modified Impact Results: Renewable Electricity' table. The reduced impacts resulting from allocated RECs at Athens, GA and Kansas City, KC were calculated using 100% wind-generated electricity, covering 34% of the plant's electricity consumption in 2021 and 2022. The REC data was modeled using the 'US-SERC Electricity production, wind, 1-3MW turbine, onshore' dataset, with a carbon intensity of 13.2 kg CO2e/MWh*. Any remaining energy not covered by RECs was modeled based on local energy grid information for the manufacturing sites.

The table reflects the results for faced batts.

Further Information

Modified Impact Results: Renewable Electricity: Unfaced Batt (per 1 m2 of material with RSI = 1m2K/W)

LCIA Method	Impact Category	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
IPCC AR5 GWP 100	GWP-total	kg CO2 eq	8.64e-1	6.64e-2	4.09e-3	0	4.00e-4	0	1.17e-2
TRACI 2.1	ODP	kg CFC 11 eq	3.41E-07	2.48e-12	1.42e-14	0	1.42e-14	0	6.43e-16
TRACI 2.1	AP	kg SO2 eq	1.54E-03	3.93e-4	1.68e-5	0	2.26e-6	0	6.94e-5
TRACI 2.1	EP	kg N eq	9.47E-04	2.18e-5	5.31e-6	0	1.25e-7	0	3.04e-6
TRACI 2.1	POCP	kg O3 eq	2.58E-02	1.08e-2	9.98e-5	0	6.22e-5	0	1.26e-3
TRACI 2.1	ADP-fossil	MJ	1.79E+00	1.16e-1	9.46e-4	0	6.66e-4	0	2.63e-2
TRACI 2.1	GWP-total	kg CO2 eq	9.12e-1	6.55e-2	2.58e-3	0	3.76e-4	0	1.31e-2

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 reducing CO2 equivalent emissions from electricity usage in the United States and Canada.

The updated results incorporate the impact of RECs on the electricity used in the manufacturing process (A3), as shown in the aggregated A1, A2, and A3 data in the 'Modified Impact Results: Renewable Electricity' table. The reduced impacts resulting from allocated RECs at Athens, GA and Kansas City, KC were calculated using 100% wind-generated electricity, covering 34% of the plant's electricity consumption in 2021 and 2022. The REC data was modeled using the 'US-SERC Electricity production, wind, 1-3MW turbine, onshore' dataset, with a carbon intensity of 13.2 kg CO2e/MWh*. Any remaining energy not covered by RECs was modeled based on local energy grid information for the manufacturing sites."

Kraft Facer Environmental Impacts

Environmental Impact Indicator	Kraft Facer- per 1 m2
IPCC AR5 GWP 100- kg CO2 eq	1.61E-01
TRACI 2.1 ODP- kg CFC 11 eq	-1.35E-07
TRACI 2.1 AP- kg SO2 eq	1.60E-04
TRACI 2.1 EP- kg N eq	2.00E-05
TRACI 2.1 POCP- kg O3 eq	2.70E-03
TRACI 2.1 ADP-Fossil- MJ	1.80E-02
TRACI 2.1 GWP-Total- kg CO2 eq	1.60E-02
PERE- MJ	3.22E-01
PERT- MJ	3.22E-01
PENRE- MJ	2.50E-01
PENRT- MJ	2.50E-01
FW- m3	5.00E-05
HWD- kg	2.28E-09
NHWD- kg	5.70E-04
HLRW- kg	2.10E-09
ILLRW- kg	2.80E-06

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
- EN 15804 EN 15804 + A2:2019, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.
- ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework
- ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 21930, Sustainability in building construction – Environmental declaration of building products
- ISO 14026:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- Sphera LCA FE Databases. <https://sphera.com/product-sustainability-software/>
- US LCI Database. <https://www.nrel.gov/lci/>
- Ecoinvent v3.9 Database. <http://ecoinvent.org/>
- CertainTeed Insulation Websites. <https://www.certainteed.com/building-insulation/products/> and <https://www.certainteed.com/technical-insulation/products/>