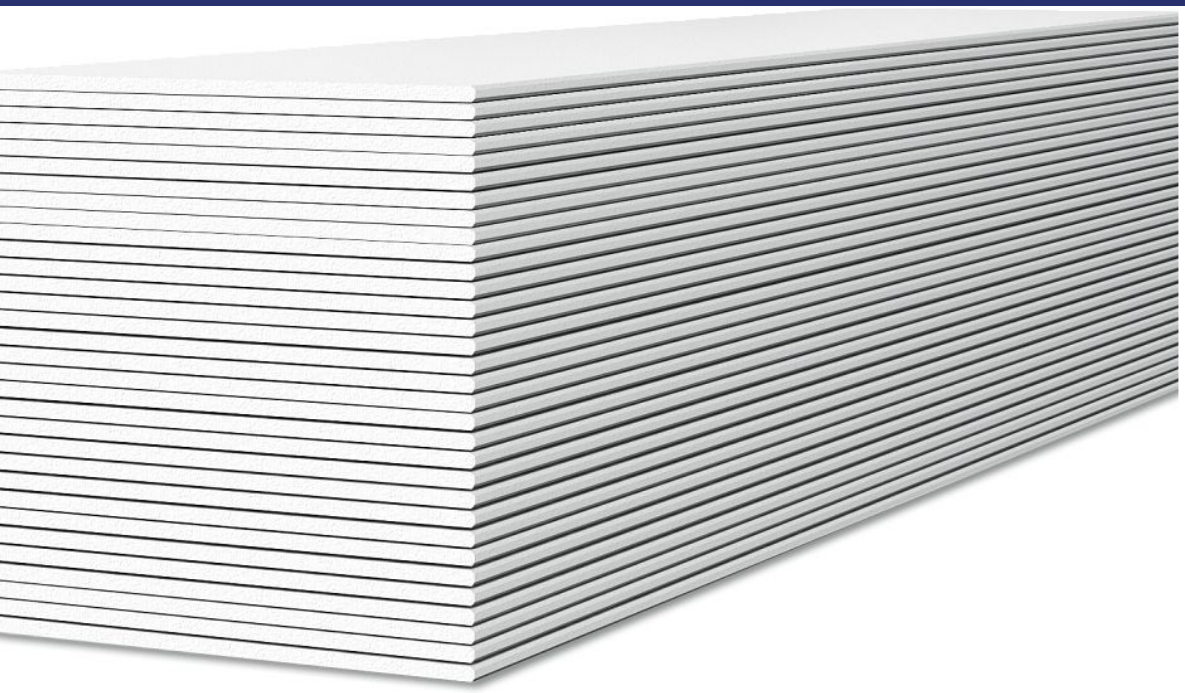
ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

SmartEPD-2025-038-0231-01

GlasRoc® Shaftliner Gypsum Board - Nashville



certainteed
SAINT-GOBAIN

SMART EPD
CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION

Date of Issue: Jan 14, 2025

Expiration: Jan 14, 2030

Last updated: Jan 14, 2025

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General Information



CertainTeed

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1-800-446-5284

gypsumtechnicalsupport@saint-gobain.com certainteed.com

Product Name:	GlasRoc® Shaftliner Gypsum Board - Nashville
Declared Unit:	92.9 m2
Declaration Number:	SmartEPD-2025-038-0231-01
Date of Issue:	January 14, 2025
Expiration:	January 14, 2030
Last updated:	January 14, 2025
EPD Scope:	Cradle to grave A1 - A3, A4, A5, B1 - B7, C1 - C4
Market(s) of Applicability:	North America

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/

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.

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	NSF PCR for Gypsum Panel Products v.1.1 Date of issue: April 01, 2020 Valid until: December 31, 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 Ranjani Theregowda | Smart EPD LLC | ranjani.theregowda@smartepd.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Ranjani Theregowda | Smart EPD LLC | ranjani.theregowda@smartepd.com

Product Information

Declared Unit:	92.9 m2
Mass:	1816.48 kg
Reference Service Life:	75 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Product Description

CertainTeed's GlasRoc Shaftliner Type X is an innovative solution for those looking to create high-performance fire-resistant walls and ceilings in shafts and elevator areas. Made from high-quality materials,
GlasRoc Shaftliner Type X provides superior protection against fire, moisture, and mold. GlasRoc Shaftliner Type X features a unique design that includes reinforced fiberglass mat facers, providing exceptional strength and durability. This design ensures that the wall and ceiling remain intact and stable, even in high-moisture areas such as bathrooms, kitchens, and basements.
Easy to install, GlasRoc Shaftliner Type X can be cut to size using a utility knife or saw, ensuring a perfect fit for any project. Its lightweight construction also makes it easy to handle and work with, reducing the risk of fatigue and injury during installation.
Designed to resist fire, moisture, and mold, GlasRoc Shaftliner Type X is an ideal option for areas that require a high level of fire resistance. It is also resistant to moisture and mold, making it a safe option for any project.
In addition to its superior performance, GlasRoc Shaftliner Type X is also an eco-friendly option. It meets GREENGUARD® Gold for low emitting VOC content.

Further information can be found at: https://www.certainteed.com/products/drywall-products/glasroc-shaftliner-type-x

Product Specifications

Product Classification Codes:	UNSPSC - 301615 EC3 - Finishes -> Gypsum
Thickness:	1 inches
Fire rating:	X
Gypsum Board Facing:	Glass mat
R Factor:	N/A RSI
Flame Spread Index (ASTM E84):	0
Smoke Production:	0
Surface Abrasion (ASTM D4977):	N/A cycles
Indentation (ASTM D5420):	N/A mm
Soft Body Impact (ASTM E695):	N/A joules
Hard Body Impact (ASTM C1929):	N/A joules
Options:	✓ Mold Resistant ✓ Moisture Resistant

Material Composition

Material/Component Category	Origin	% Mass
Gypsum	Undisclosed	85 - 95
Internally Recycled Gypsum	Undisclosed	2 - 9
Fiberglass	Undisclosed	1 - 5
Silicone	Undisclosed	0 - 1
Additives	Undisclosed	0 - 1

Packaging Material	Origin	kg Mass
Polyethylene low density granulate	Undisclosed	0.05
Spacer (Rejected gypsum board)	Undisclosed	0.9
Polyethylene high density granulate	Undisclosed	0.05

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

EPD Data Specificity

Primary Data Year: 2023

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD.

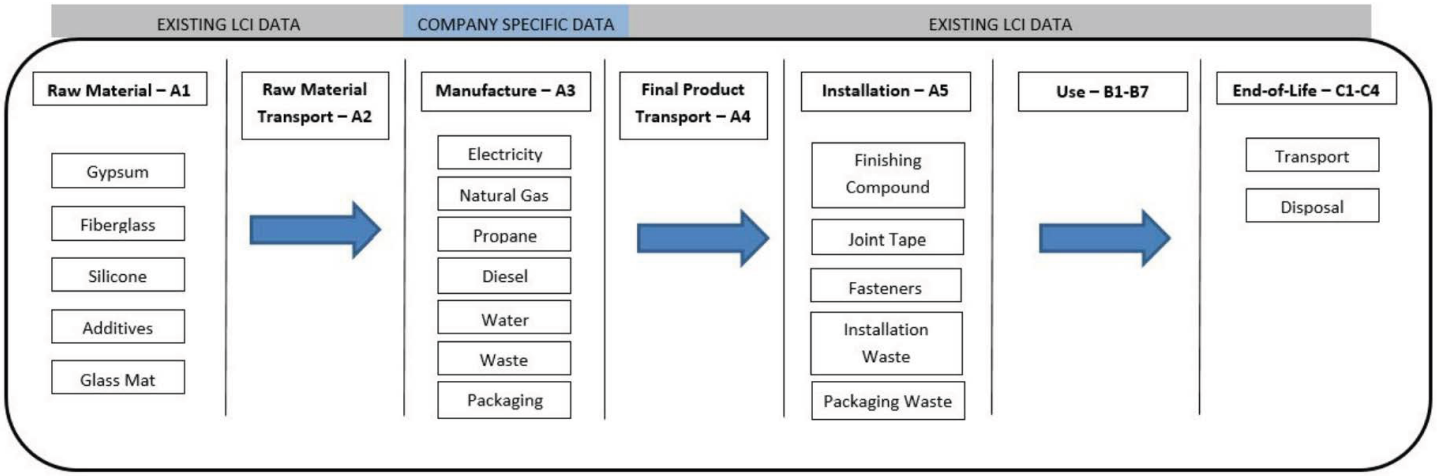
System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	✓
	B2	Maintenance	✓
	B3	Repair	✓
	B4	Replacement	✓
	B5	Refurbishment	✓
	B6	Operational Energy Use	✓
	B7	Operational Water Use	✓
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 Gypsum
794 State Hwy 369 N, Nashville, AR, USA

Product Flow Diagram



Software and Database

LCA Software:	Sphera LCA for Experts (formerly GaBi) v. 10.7.1
LCI Foreground Database(s):	GaBi Professional Database v. 2022
LCI Background Database(s):	US LCI v. | 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

Manufacturing

The process begins with internally recycled gypsum material added to the natural gypsum raw material. Water is then added to produce a stucco slurry. Additional additives are mixed with the slurry as indicated by the specific product recipe. Large rolls of the facing and backing paper are loaded onto spools that feed the manufacturing line. The backing paper is fed through first, the slurry is applied to the backing paper, and then the facing paper is fed through the line and applied on top of the slurry. The wet board is fed through rollers to ensure proper thickness and allow the material set. The boards are then cut to length and aligned for processing through the ovens for the remainder of the drying process. After drying in the ovens, the boards are stacked by two, with end tape applied for shipping.

Packaging

Packaging of the final product after production is included in the life cycle assessment. Packaging material includes the end tape applied at the end of the manufacturing process, as well as spacers used to stack the boards at varying heights for easier loading and unloading. The spacers used in the packaging are made at the manufacturing facility using rejected boards 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 gypsum board product is made in Nashville, AR. However, there are additional products produced at this location that were excluded from the study.

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
Liters of Fuel:	4 l/100km
Vehicle Type:	Commercial tractor-trailer truck
Transport Distance:	448 km
Capacity Utilization:	70 %
Packaging Mass:	1.938 kg
Capacity utilization volume factor:	<1

Fuel Type:	Diesel
Liters of Fuel:	8.8 l/100km
Vehicle Type:	Rail
Transport Distance:	208 km
Capacity Utilization:	70 %
Packaging Mass:	1.938 kg

Fuel Type:	Diesel
Liters of Fuel:	4 l/100km
Vehicle Type:	Single unit truck
Transport Distance:	40 km
Capacity Utilization:	70 %
Packaging Mass:	1.938 kg
Assumptions for scenario development:	Final products are transported via truck throughout North America. Distances and modes of transport for final product transportation are specified in the PCR.

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	10 %
Ancillary Materials:	60.573 kg
Product Lost per Functional Unit:	181.65 kg
Mass of Packaging Waste Specified by Type:	1.938 kg
Biogenic Carbon Contained in Packaging:	0.021 kg
Assumptions for scenario development:	The Gypsum Panel PCR specifies the default on-site installation waste scenario is 10% of the installed surface area. The PCR also specifies ancillary materials required for installation of gypsum panels as joint compound, joint tape, and fasteners. This study used the installation calculator located on the CertainTeed Gypsum website to calculate the amount of ancillary materials required for installation. In addition, disposal of the packaging material is included in the installation phase.

Reference Service Life (B1)

B1 Module

RSL:	75 Years

Use Conditions:

As specified in the PCR, gypsum panel products are assumed to have no material or energy inputs or emissions during the use (B1), maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) life cycle stages. The PCR also specifies that gypsum panel products are assumed to have no operational energy use (B6) and no operational water use (B7) during the use phase of the life cycle.

Maintenance (B2)
B2 Module

Maintenance Process Information: None required

Repair (B3)
B3 Module

Repair Process Information: None required

Replacement (B4)
B4 Module

Further assumptions for scenario development: None required

Refurbishment (B5)
B5 Module

Refurbishment Process Description: None required

Operational Energy Use (B6) & Operational Water Use (B7)
B6 & B7 Modules

Characteristic Performance:

None required

End of Life (C1 - C4)
C1 - C4 Modules

Collection Process

Collected with Mixed Construction Waste: 1634.8 kg

Disposal

Product or Material for Final Disposal: 1634.8 kg

Assumptions for scenario development:

The PCR supports the scenario for industry practices that all gypsum panel products shall be disposed in an appropriate construction and demolition landfill at the end of life. At this time, there are no known scenarios for the deconstruction of gypsum boards from the building at the end of life, although the PCR requires inclusion of the energy required for deconstruction and dust released in the air. The deconstruction module (C1) for this study is assumed to use 0.05 MJ of energy in order to be consistent with previous CertainTeed Gypsum Board studies. At this time, there is no known method for distinguishing gypsum board dust from the overall dust generated in the demolition of a building, so the deconstruction module assumed no dust generated. The PCR also specifies the assumption that no gypsum panel waste goes to a waste processing facility prior to disposal in a landfill, so the waste processing module (Module C3) is assumed to be burden free. The product's end-of-life disposition is assumed to be inert in a landfill per the PCR. Disposal in an appropriate construction and demolition landfill or in commercial incineration facilities is permissible and should be done in accordance with local, provincial, and federal regulations.

Results

Environmental Impact Assessment Results

IPCC AR6 GWP 100, TRACI 2.1, CML 2016 v4.8
per 92.9 m2 of product .
LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Nashville GlasRoc Shaftliner

Impact Category	Method	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP-total [including biogenic carbon]	IPCC AR6 GWP 100	kg CO2 eq	572	82.5	23.4	ND	ND	ND	ND	ND	ND	ND	7.64	19.8	ND	34.6
GWP-total [including biogenic carbon]	TRACI 2.1	kg CO2 eq	566	82	22.4	ND	ND	ND	ND	ND	ND	ND	7.6	19.7	ND	34.2
GWP-fossil [excluding biogenic carbon]	IPCC AR6 GWP 100	kg CO2 eq	572	82.4	61.4	ND	ND	ND	ND	ND	ND	ND	7.64	19.8	ND	34.7
GWP-fossil [excluding biogenic carbon]	TRACI 2.1	kg CO2 eq	566	81.9	60.4	ND	ND	ND	ND	ND	ND	ND	7.6	19.7	ND	34.3
ODP	TRACI 2.1	kg CFC 11 eq	0.000344	2.13e-13	4.26e-7	ND	ND	ND	ND	ND	ND	ND	1.67e-14	5.12e-14	ND	1.68e-12
AP	TRACI 2.1	kg SO2 eq	1.57	0.257	0.327	ND	ND	ND	ND	ND	ND	ND	0.0377	0.0592	ND	0.181
EP	TRACI 2.1	kg N eq	0.185	0.0258	0.0535	ND	ND	ND	ND	ND	ND	ND	0.00135	0.00604	ND	0.00795
POCP	TRACI 2.1	kg O3 eq	27.4	6.99	3.72	ND	ND	ND	ND	ND	ND	ND	0.686	1.35	ND	3.31
ADP-fossil	CML 2016 v4.8	MJ	3140	154	159	ND	ND	ND	ND	ND	ND	ND	12.9	36.9	ND	68.9

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-total = GWP-biogenic + GWP-fossil + GWP-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 92.9 m2 of product .

Nashville GlasRoc Shaftliner

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
PERE	MJ	511	46.3	327	ND	ND	ND	ND	ND	ND	ND	0.764	11.1	ND	64.1
PERM	MJ	0.207	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PERT	MJ	511	46.3	327	ND	ND	ND	ND	ND	ND	ND	0.764	11.1	ND	64.1
PENRE	MJ	9540	1160	1330	ND	ND	ND	ND	ND	ND	ND	97.9	279	ND	547
PENRM	MJ	231	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENRT	MJ	9540	1160	1330	ND	ND	ND	ND	ND	ND	ND	97.9	279	ND	547
RPRE	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPRM	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPRT	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NRPRE	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NRPRM	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NRPRT	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ADP-fossil	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SM	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RSF	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NRSF	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FW	m3	1.18	0.159	1.67	ND	ND	ND	ND	ND	ND	ND	0.00131	0.0381	ND	0.0678

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, 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 92.9 m2 of product .

Nashville GlasRoc Shaftliner

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD	kg	8.41e-8	3.34e-9	4.35e-7	ND	ND	ND	ND	ND	ND	ND	2.78e-10	8.02e-10	ND	1.36e-8
NHWD	kg	462	0.101	190	ND	ND	ND	ND	ND	ND	ND	0.0172	0.0243	ND	1640
RWD	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HLRW	kg	0.0000893	0.00000395	0.0000132	ND	ND	ND	ND	ND	ND	ND	3.09e-7	9.49e-7	ND	0.00000677
ILLRW	kg	0.0754	0.00333	0.0124	ND	ND	ND	ND	ND	ND	ND	0.000259	0.000799	ND	0.00605
CRU	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MFR	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MER	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MNER	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EEE	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EET	MJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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 92.9 m2 of product .

Nashville GlasRoc Shaftliner

Indicator	Unit	A1A2A3
BCRP	kg CO2	ND
BCEP	kg CO2	ND
BCRK	kg CO2	ND
BCEK	kg CO2	ND
BCEW	kg CO2	ND
CCE	kg CO2	ND
CCR	kg CO2	ND
CWNR	kg CO2	ND

Note:

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

Abbreviations:

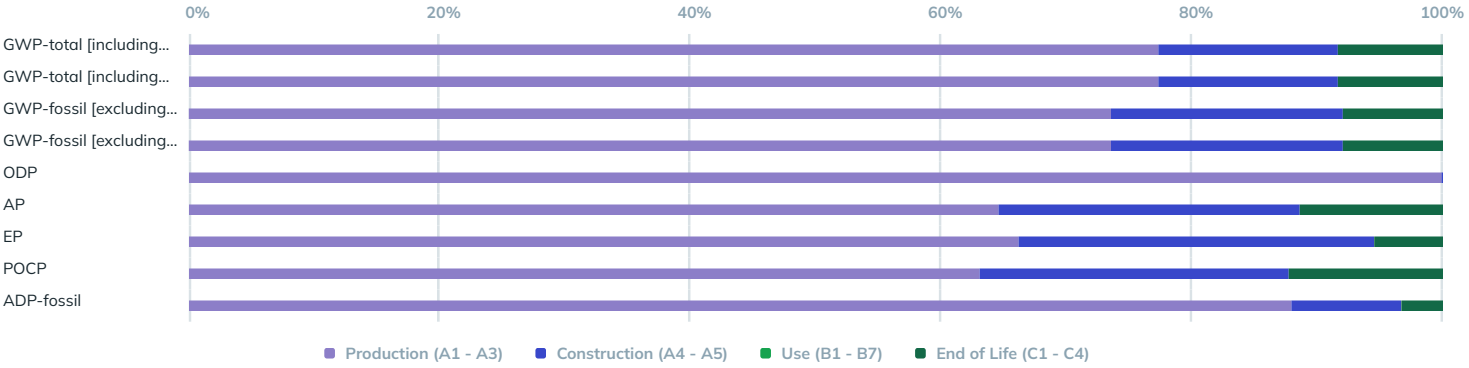
BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = 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.

Interpretation

Based on the results from the life cycle assessment model, the life cycle impacts are strongly driven by the manufacture. The impacts of the manufacture are primarily attributed to the natural gas usage needed for the ovens to dry the boards. The natural gas usage in the manufacture accounts for as much as 34% of the cradle-to-grave environmental impact potentials for CertainTeed GlasRoc Shaftliner Gypsum Boards at the Nashville, AR facility.

The manufacturing of gypsum board (A3) has the highest contribution to Global Warming Potential impacts. The switch from paper facing material to fiberglass mat accounts for the higher raw material impacts for GlasRoc Sheathing versus typical gypsum board. The use of internally recycled gypsum material helps to reduce the overall environmental impact potentials by reducing the amount of external raw materials needed for the process.

Another potentially significant contributor to the overall environmental impact results is seen in the results for the installation of the Gypsum Boards. The installation waste accounts for the majority of the impacts for installation. The PCR requires the use of a 10% installation waste scenario in the absence of actual data. As there is currently no actual installation data available, and because installation techniques may vary widely among installers, CertainTeed has little to no influence on the installation 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 GlasRoc Shaftliner product 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.

Further Information

Modified Impact Results: Renewable Electricity: GlasRoc Shaftliner

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 Nashville, AR were calculated using 100% wind-generated electricity, covering 26% of the plant's electricity consumption in 2023. 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 site(s).

Modified Impact Results: Renewable Electricity: GlasRoc Shaftliner

LCIA Method	Impact Category	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
IPCC AR6 GWP	GWP-total	kg CO2 eq	5.60E+02	8.25E+01	2.34E+01	7.64E+00	1.98E+01	0	3.46E+01
TRACI 2.1	GWP-total	kg CO2 eq	5.54E+02	8.19E+01	6.04E+01	7.60E+00	1.97E+01	0	3.43E+01
TRACI 2.1	ODP	kg CFC 11 eq	3.44e-04	2.13E-13	4.26E-07	1.67E-14	5.12E-14	0	1.68E-12
TRACI 2.1	AP	kg SO2 eq	1.57E+00	2.57E-01	3.27E-01	3.77E-02	5.92E-02	0	1.81E-01
TRACI 2.1	EP	kg N eq	1.86E-01	2.58E-02	5.35E-02	1.35E-03	6.04E-03	0	7.95E-03
TRACI 2.1	POCP	kg O3 eq	2.74E+01	6.99E+00	3.72E+00	6.86E-01	1.35E+00	0	3.31E+00
CML	ADP-fossil	MJ	3.14e+03	1.54E+02	1.59E+02	1.29E+01	3.69E+01	0	6.89E+01
IPCC AR6 GWP	GWP-fossil	kg CO2 eq	5.60e+02	8.24E+01	6.14E+01	7.64E+00	1.98E+01	0	3.47E+01
TRACI 2.1	GWP-fossil	kg CO2 eq	5.54E+02	8.19E+01	6.04E+01	7.60E+00	1.97E+01	0	3.43E+01

References

•Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 3.2 2018. UL Environment.

•Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products. April 23, 2020. NSF International.

•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/

•US LCI Database. https://www.nrel.gov/lci/

•Ecoinvent Database. http://ecoinvent.org/

•CertainTeed Gypsum Website. https://www.certainteed.com/products/drywall-products-systems-products