ENVIRONMENTAL PRODUCT DECLARATION

GLASROC SHEATHING 5/8" GYPSUM BOARD

CERTAINTEED GYPSUM
SEATTLE, WA

The CertainTeed GlasRoc Advantage:

- Non-combustible
- Consistently high quality
- Uniformly flat, attractive appearance, no shadows
- Increased durability
- No wavy edges, warps, bows or deformities
- Uniform high strength cores eliminate crumbling and cracking
- Edge tapers consistent to form perfect joints
- Excellent thermal barrier and sound attenuation qualities

CertainTeed SAINT-GOBAIN

Architects, contractors and manufacturers continue to look for ways to reduce our industry's impacts on the environment while meeting customer demand for products that deliver beauty, comfort and performance. CertainTeed Gypsum, the leader in innovative drywall and performance wallboards, has the products to make you property healthier, quieter and more comfortable.

CertainTeed Gypsum operates its manufacturing facilities with a responsible and environmentally conscious ethic that includes reclamation, preservation of natural resources, recycling and waste management. CertainTeed, and Saint-Gobain, are committed to providing sustainable building products and to limiting our impacts on the environment while doing so. (See our CSR at https://www.saint-gobain.com/en/commitments/saint-gobains-csr-commitments.)

For more information visit: www.CertainTeed.com

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

CertainTeed SAINT-GOBAIN

GlasRoc Sheathing 5/8" Gypsum Board
Seattle, WA

According to ISO 14025/44/40 Series and ISO 21930:2017

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	CertainTeed Gypsum, Inc. • 20 Moores Road • Malvern, PA 19355 • USA
DECLARATION NUMBER	4789532059.140.1
DECLARED PRODUCT	GlasRoc Sheathing 5/8" Gypsum Board – Seattle, WA
REFERENCE PCR	NSF International PCR for Gypsum Panel Products v.1e October 2019
REFERENCE PCR STANDARD	☐ EN 15804 (2012) ☐ ISO 21930 (2007) ☒ ISO 21930 (2017)
DATE OF ISSUE	January 1, 2021
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	NSF International PCR Peer Review Panel ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas Gloria, Ph.D., Industrial Ecology Consultants

This EPD conforms with ISO 21930:2017

Environmental Product Declaration

CertainTeed SAINT-GOBAIN

GlasRoc Sheathing 5/8" Gypsum Board
Seattle, WA

According to ISO 14025/44/40 Series and ISO 21930

Product Documentation

Product Description

CertaintTeed GlasRoc Sheathing Gypsum Board is an exterior gypsum board consisting of paperless glass mat facers incorporated with a water resistant gypsum core. GlasRoc Sheathing's engineered glass mat facers provide a superior water and UV resistant surface for long term protection to weather exposure. CertainTeed GlasRoc Sheathing features long-term protection to weather exposure, mold resistance, and excellent fire resistance properties. GlasRoc Sheathing meets or exceeds all physical property requirements, offering strength with enough flexibility to bend to curved surfaces.

The CertainTeed GlasRoc Sheathing Advantage:

- Non-combustible
- Consistently high quality
- Uniformly flat, attractive appearance, no shadows
- Increased durability
- No wavy edges, warps, bows or deformities
- Uniform high strength cores eliminate crumbling and cracking
- Edge tapers consistent to form perfect joints
- Excellent thermal barrier and sound attenuation qualities

Application

GlasRoc Sheathing panels are approved substrates by the major EIFS manufacturers, one-coat and conventional stucco systems, traditional cladding systems, exterior ceilings, soffit systems and exterior curved applications..

GlasRoc Sheathing is not a structural product and therefore is not a replacement for plywood or structurally engineered sheathing where required for shear wall designs. Do not use GlasRoc Sheathing as a base for nailing or mechanical fastening.

CertainTeed SAINT-GOBAIN

GlasRoc Sheathing 5/8" Gypsum Board
Seattle, WA

According to ISO 14025/44/40 Series and ISO 21930

Technical Data

Technical Data GlasRoc Sheathing 5/8"	
Thickness	5/8" (15.9mm)
Width	4' (1220 mm)
Length	8' (2440)
Weight	2.57 lbs/ft^2 (12.5 kg/m^2)
UNSPSC Code	301615
CSI Code	092900
Flame Spread Rating (ASTM E84, CAN/ULC-S102)	0
Smoke Developed Rating (ASTM E84, CAN/ULC-S102)	0
Combustibility (ASTM E136, CAN/ULC-S114)	Non-combustible
Applicable Standards and References	
ASTM C1177 and C1396	Standard Specification for Gypsum Board: Type X Standard
CAN/CSA-A82.27	Gypsum Board
ASTM E2178, CAN/ULC-S741	Air Barrier Materials
ASTM E2357, CAN/ULC-S742	Air Barrier Assemblies
ASTM C840	Standard Specification for Application and Finishing of Gypsum Board
CAN/CSA-A82.31	Gypsum Board Application
ASTM C1280	Gypsum Sheathing and Soffits
Gypsum Association GA-216	Application and Finishing of Gypsum Panel Products
Gypsum Association GA-214	Quick Reference Guide Levels of Finish
ICC International Building Code (IBC)	
ICC International Residential Code (IRC)	
National Building Code of Canada (NBCC)	

Table 1: Technical Data and Applicable Standards for CertainTeed GlasRoc Sheathing 5/8" Gypsum Board

CertainTeed SAINT-GOBAIN

GlasRoc Sheathing 5/8" Gypsum Board
Seattle, WA

According to ISO 14025/44/40 Series and ISO 21930

Description of Organization

This EPD is specific to the GlasRoc Sheathing Gypsum Board manufactured at the CertainTeed Gypsum facility in Seattle, WA.

- CertainTeed Gypsum
  5931 East Marginal Way South
  Seattle, WA 98134

The Seattle, WA manufacturing facility operates integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Flow Diagram

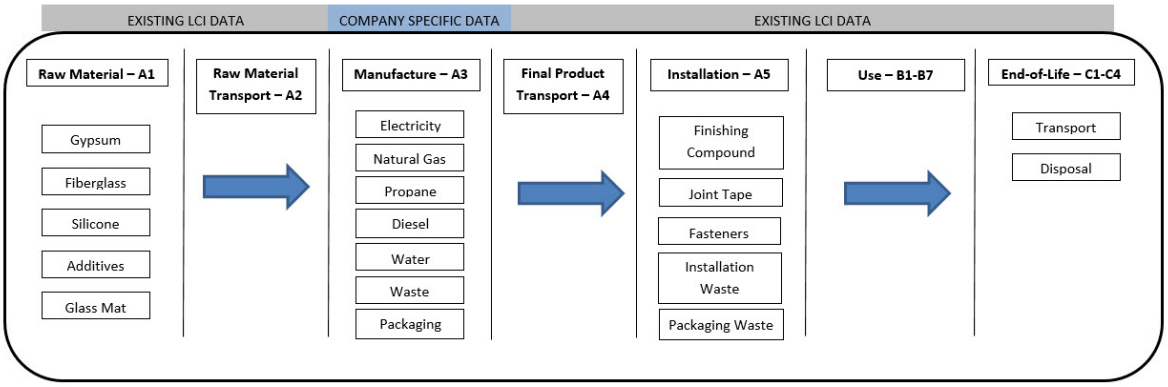

Figure 1: Life Cycle Boundary Flow Diagram

Material Content

Component	GlasRoc Sheathing 5/8"
Internally recycled Gypsum	8.04%
Natural Gypsum	86.01%
Fiberglass	0.27%
Silicone	0.31%
Additives	0.16%
Paper facings	5.22%
Total kg/FU:	**1165**

Table 2: Material Content for CertainTeed GlasRoc Sheathing 5/8" Gypsum Board (Seattle, WA)

Methodological Framework

Functional Unit

Functional Unit = 92.9 m^2 (1000 ft^2)		
Product	**Mass (kg/FU)**	**Thickness (cm)**
Glasroc Sheathing Gypsum Board	1165	1.5875 cm (5/8")

Table 3: Functional Unit

Reference Service Life

The Reference Service Life used in the study is 75 years, as specified in the PCR.

System Boundary

The life cycle analysis performed for this EPD is classified as a "cradle-to-grave" study. The system boundary includes raw material supply, manufacture, and transport; the GlasRoc Sheathing Gypsum Board manufacture in Seattle, WA and packaging; product transportation to building site; installation; use phase, and product end-of-life.

Description of the System Boundary (X=included in LCA: MND=module not declared)																
Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits & Loads Beyond System Boundaries
Raw Material Supply	Transport	Manufacturing	Transport from the gate to the site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-construction demolition	Transport	Waste Processing	Disposal	Reuse-Recover-Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Table 4: System Boundary

Allocation

There are several facilities in the United States and Canada that produce gypsum board product lines for CertainTeed. Each of the facilities produces multiple types of gypsum board. Allocation within each facility was conducted based on the machine hour run time production data provided by the facilities and the central CertainTeed Gypsum product team. This EPD is specific to the GlasRoc Sheathing Gypsum Board produced at the Seattle, WA facility.

Cut-Off Criteria

The cut-off criteria established for the study include materials, energy, and emissions data. For the purposes of this study, the crtieria are as follows:

- Mass – Chemicals with a combined weight less than 1% of the mass of the modeled product may be excluded, providing its environmental relevance is not a concern.
- Hazardous substances as defined by the U.S. Resource Conservation and Recovery Act (RCRA), will be included if representing more than 0.1% of the product composition.
- Human activity factors were not included in the scope of this study.
- Capital equipment factors were not includd in the scope of this study.

Data Sources

GaBi version 9.2 software system was used for modeling the life cycle of the CertainTeed GlasRoc Sheathing Gypsum Board products. Each background dataset was taken from the GaBi Thinkstep US Ecoinvent, USLCI databases, and Ecoinvent v3.

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 and Europe (depending on the material source) in terms of the geographic and technological coverage and are less than 10 years old. Any deviations from these initial data quality requirements for secondary data are documented in the report. Overall, the primary data from the manufacturing location is of very high quality, being directly tracked and measured by facility personel. Secondary data sets are of fair-to-good quality.

Period Under Review

Data for this LCA was collected for the 2019 calendar year.

Estimates and Assumptions

Estimates and assumptions are required in life cycle analysis to constrain the project boundary or model when little or not data is available. In this study of CertainTeed GlasRoc Sheathing Gypsum Board, any estimates or assumptions made are appropriately documented in the background report.

Comparability

Comparison of the environmental performance of building and construction products using EPD information shall be based on the product's use and impacts at the building level. In general, EPDs may not be used for comparability purposes when not considered in a building context. As noted in the PCR, only EPDs generated from cradle-to-grave life cycle results and based on the same function, RSL, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to compare between products.

Technical Information and Scenarios

Manufacturing (A3)

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 glass mat are loaded onto spools that feed the manufacturing line. The backing glass mat is fed through first, the slurry is applied to the backing glass mat, and then the facing glass mat 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.

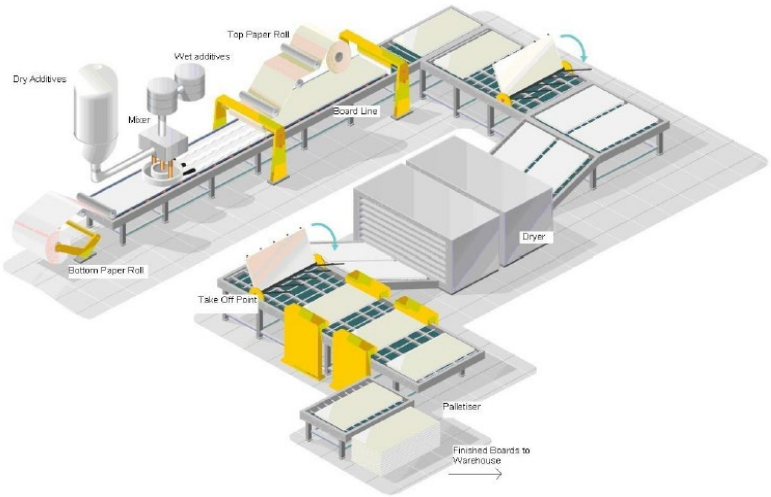

Figure 2: Gypsum Board Manufacturing Diagram

Packaging (A3)

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.

Transportation (A4)

Final products are transported via truck throughout North America. Distances and modes of transport for final product transportation are specified in the PCR.

Information	Unit	Value
Type of transport	Product shipping to distribution center	
Type of vehicle	Commercial tractor-trailer truck	
Distance	km	448
Fuel type	Diesel	
Amount of fuel	liters	1792 (4 L/km)
Information	**Unit**	**Value**
Type of transport	Product shipping to distribution center	
Type of vehicle	Rail	
Distance	km	208
Fuel type	Diesel	
Amount of fuel	liters	1830.4 (8.8 L/km)
Information	**Unit**	**Value**
Type of transport	Product shipping to construction site	
Type of vehicle	Single unit truck	
Distance	km	40
Fuel type	Diesel	
Amount of fuel	liters	160 (4 L/km)

Table 5: Final Product Transportation (A4)

Installation (A5)

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.

Installation (A5)	Unit	GlasRoc Sheathing 5/8"
Product loss	kg	116.5
Ancillary materials	kg	60.573
Joint Compound	kg	56.70
Joint Tape	kg	0.873
Fasteners	kg	3.00
Electricity consumption	kWh	0
Other energy consumption	kWh	0
Water consumption	m^3	0
Direct emissions to ambient air, soil, and water	kg	0
Waste materials as output from installation process	kg	116.5

Table 6: Installation (A5)

Information	Unit	GlasRoc Sheathing 5/8"
Mass of packaging waste	kg	1.938
Type of packaging waste	Non-hazardous co-mingled construction waste to landfill	
Biogenic carbon content of packaging (where relevant)	kg CO_2 eq	0.021

Table 7: Packaging Waste (A5)

Use (B1-B7)

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)	Unit	GlasRoc Sheathing 5/8"
Information on maintenance	-	None required
Maintenance cycle	Number/RSL	0
Water consumption	m^3	0
Ancillary inputs for maintenance	kg	0
Other resources	kg	0
Electricity consumption	MJ	0
Other energy carriers	MJ	0
Waste materials resulting from maintenance	kg	0

Table 8: Maintenance (B2)

Repair (B3)	Unit	GlasRoc Sheathing 5/8"
Information on repair process	-	None required
Repair cycle	Number/RSL	0
Water consumption	m^3	0
Ancillary inputs for repair	kg	0
Other resources	kg	0
Electricity consumption	MJ	0
Other energy carriers	MJ	0
Waste materials resulting from repair	kg	0

Table 9: Repair (B3)

Replacement (B4)	Unit	GlasRoc Sheathing 5/8"
Information on replacement process	-	None required
Replacement cycle	Number/RSL	0
Material inputs for replacement	kg	0
Electricity consumption	MJ	0
Waste materials resulting from replacement	kg	0

Table 10: Replacement (B4)

Refurbishment (B5)	Unit	GlasRoc Sheathing 5/8"
Information on refurbishment process	-	None required
Refurbishment cycle	Number/RSL	0
Material inputs for refurbishment	kg	0
Electricity consumption	MJ	0
Waste materials resulting from refurbishment	kg	0

Table 11: Refurbishment (B5)

Operational Energy Use (B6)	Unit	GlasRoc Sheathing 5/8"
Electricity consumption	MJ	0
Operational Water Use (B7)	**Unit**	**GlasRoc Sheathing 5/8"**
Water consumption	m^3	0

Table 12: Operational Energy and Water Use (B6-B7)

End of Life (C1-C4)

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.

Parameter		Unit	Value
Assumptions for scenario development		-	Disposal inert in landfill transported by truck
End of Life (C1-C4)			**GlasRoc Sheathing 5/8"**
Deconstruction	Energy use	MJ	0.05
Collection Process	Collected separately	kg	0.00
	Collected with mixed construction waste	kg	1048.3
Recovery	Reuse	kg	0.00
	Recycling	kg	0.00
	Landfill	kg	0.00
	Incineration	kg	0.00
	Incinerations with energy recovery	kg	0.00
	Energy conversion efficiency rate	-	0.00
Disposal	Product or material for final deposition	kg	1048.3

Table 13: End-of-Life (C1-C4)

LCA Results

TRACI Impact Assessment Indicators (North America)

GlasRoc Sheathing Gypsum Board – TRACI Environmental Impacts – Seattle, WA							
	Global Warming Potential, excl. biogenic	*Global Warming Potential, incl. biogenic*	*Ozone Depletion Potential*	*Acidification Potential*	*Eutrophication Potential*	*Smog Creation Potential*	*Abiotic Depletion Potential (fossil)*
	kg CO_2 eq	*kg CO_2 eq*	*kg CFC 11 eq*	*kg SO_2 eq*	*kg N eq*	*kg O_3 eq*	*MJ*
Raw Materials (A1)	7.34E+01	7.32E+01	3.33E-05	4.12E-01	5.78E-02	3.97E+00	1.31E+02
Raw Material Transport (A2)	5.08E+01	5.08E+01	4.83E-15	1.52E+00	5.36E-02	2.91E+01	8.89E+01
Manufacture (A3)	1.86E+02	1.86E+02	5.15E-10	2.48E-01	1.55E-02	6.88E+00	4.52E+02
Total A1-A3:	**3.10E+02**	**3.10E+02**	**3.33E-05**	**2.18E+00**	**1.27E-01**	**4.00E+01**	**6.72E+02**
Final Product Transport (A4)	4.15E+01	4.16E+01	5.63E-15	2.41E-01	2.22E-02	6.22E+00	8.30E+01
Installation (A5)	6.02E+01	2.22E+01	4.26E-07	3.19E-01	5.35E-02	3.65E+00	1.58E+02
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	5.73E+00	5.73E+00	5.04E-16	1.27E-02	5.40E-04	2.49E-01	8.31E+00
Waste Transport (C2)	4.72E+00	4.82E+00	6.59E-16	1.54E-02	1.79E-03	3.47E-01	9.71E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	4.26E+01	4.30E+01	1.47E-13	1.99E-01	1.12E-02	3.51E+00	8.90E+01
Total Cradle-to-Grave:	**4.65E+02**	**4.27E+02**	**3.37E-05**	**2.96E+00**	**2.16E-01**	**5.40E+01**	**1.02E+03**

Table 14: Cradle-to-Grave TRACI Environmental Impacts

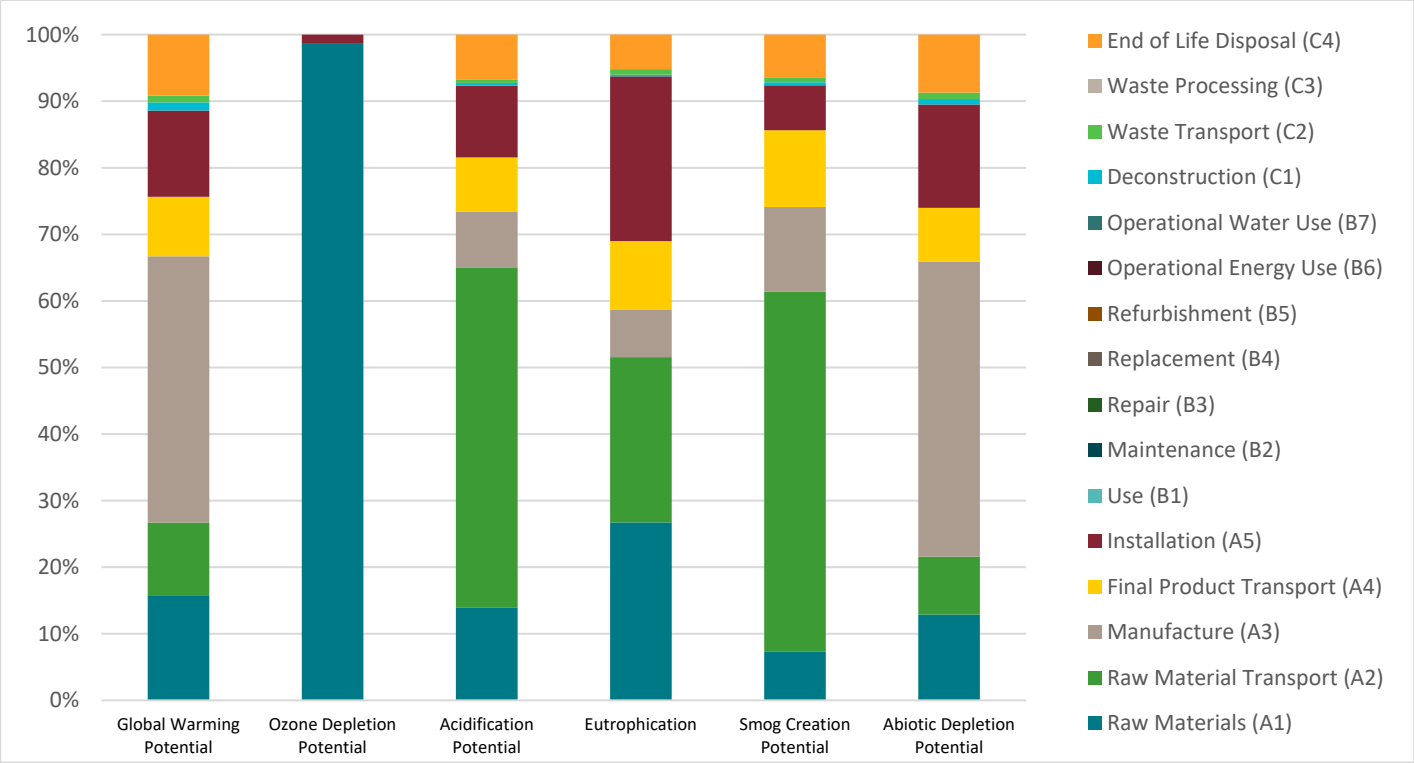

Figure 3: Cradle-to-Grave TRACI Environmental Impacts

EN 15804 Impact Assessment Indicators (Europe)

GlasRoc Sheathing Gypsum Board – EN 15804 Environmental Impacts – Seattle, WA						
	GWP (EN), TOTAL (incl. biogenic)	*ODP (EN)*	*AP (EN)*	*EP (EN)*	*POCP (EN)*	*ADPF (EN)*
	kg CO_2 eq	*kg R 11 eq*	*kg SO_2 eq*	*kg phosphate eq*	*kg ethane eq*	*MJ*
Raw Materials (A1)	7.32E+01	3.31E-05	4.17E-01	4.57E-02	2.79E-02	6.95E+02
Raw Material Transport (A2)	5.08E+01	4.83E-15	1.42E+00	1.54E-01	7.02E-02	5.99E+02
Manufacture (A3)	1.86E+02	5.14E-10	1.97E-01	3.76E-02	2.42E-02	9.16E+02
Total A1-A3:	**3.10E+02**	**3.31E-05**	**2.03E+00**	**2.37E-01**	**1.22E-01**	**2.21E+03**
Final Product Transport (A4)	4.16E+01	5.63E-15	1.76E-01	4.65E-02	-4.54E-02	5.63E+02
Installation (A5)	2.22E+01	3.66E-07	3.22E-01	4.20E-02	1.99E-02	9.93E+02
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	5.73E+00	5.04E-16	1.18E-02	1.34E-03	1.01E-03	5.61E+01
Waste Transport (C2)	4.82E+00	6.59E-16	1.14E-02	3.06E-03	-3.89E-03	6.59E+01
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	4.30E+01	1.47E-13	1.82E-01	2.27E-02	1.60E-03	5.34E+02
Total Cradle-to-Grave:	**4.27E+02**	**3.34E-05**	**2.73E+00**	**3.53E-01**	**9.55E-02**	**4.42E+03**

Table 15: Cradle-to-Grave EN 15804 Environmental Impacts

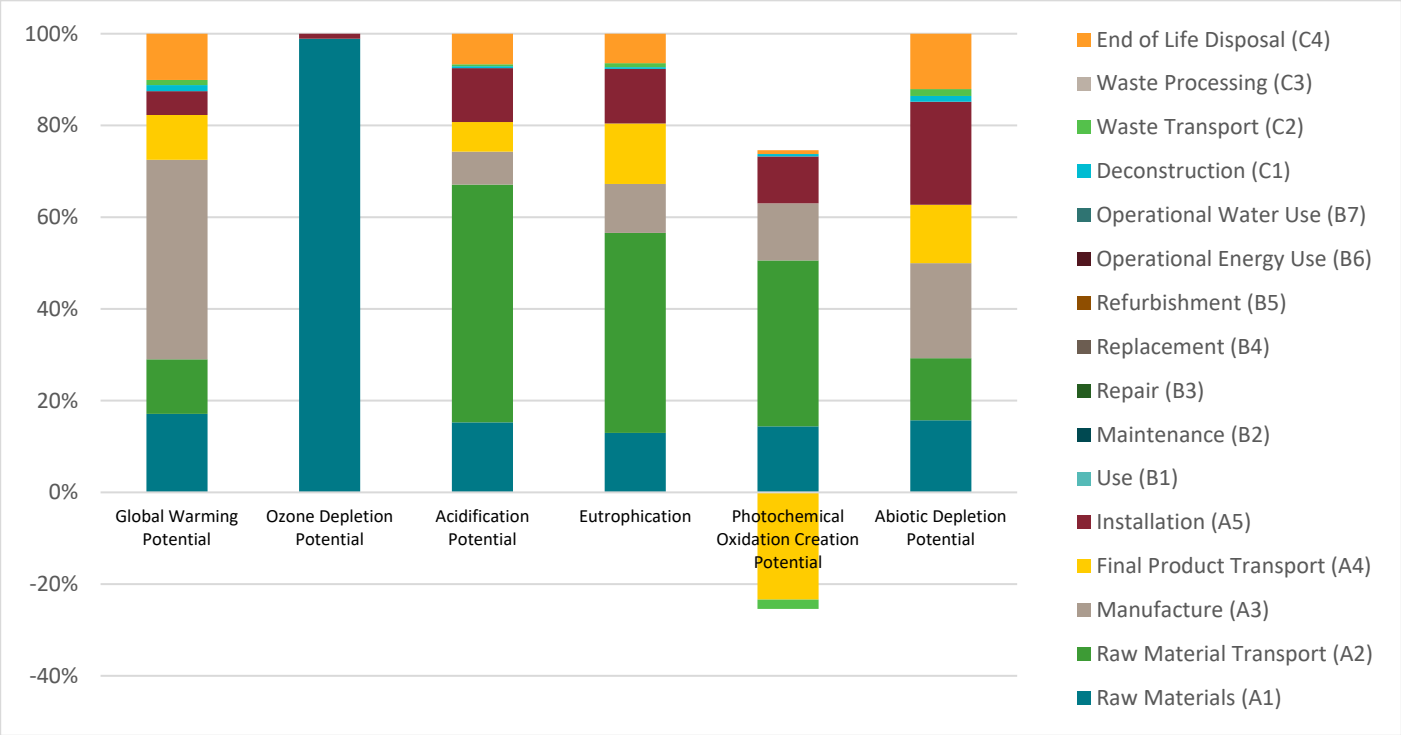

Figure 4: Cradle-to-Grave EN 15804 Environmental Impacts

Use of Primary Resources

Use of Primary Resources				
	RPR_E: *Renewable primary energy used as energy carrier (fuel)*	**RPR_M**: *Renewable primary resources with energy content used as material*	**$NRPR_E$**: *Non-renewable primary resources used as an energy carrier (fuel)*	**$NRPR_M$**: *Non-renewable primary resources with energy content used as material*
	MJ	*MJ*	*MJ*	*MJ*
Raw Materials (A1)	1.04E+02	3.72E-02	1.24E+03	3.61E-02
Raw Material Transport (A2)	5.39E+00	-8.93E-09	6.67E+02	2.33E-03
Manufacture (A3)	1.35E+02	-1.52E-07	3.16E+03	6.11E-03
Total A1-A3:	**2.44E+02**	**3.72E-02**	**5.06E+03**	**4.45E-02**
Final Product Transport (A4)	2.63E+01	-4.86E-08	6.24E+02	2.05E-02
Installation (A5)	9.46E+01	2.21E+02	1.29E+03	7.79E-02
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	3.07E-01	-1.15E-09	6.24E+01	4.21E-05
Waste Transport (C2)	3.08E+00	-5.69E-09	7.30E+01	2.40E-03
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	5.68E+01	-3.37E-08	7.02E+02	1.67E-02
Total Cradle-to-Grave:	**4.25E+02**	**2.21E+02**	**7.81E+03**	**1.62E-01**

Table 16: Use of Primary Resources

Use of Secondary Resources

Use of Secondary Resources					
	SM: *Secondary materials*	**RSF:** *Renewable secondary fuels*	**NRSF:** *Non-renewable secondary fuels*	**RE:** *Recovered energy*	**FW:** *Use of net fresh water resources*
	kg	*MJ*	*MJ*	*MJ*	*m^3*
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-02
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E+00
Total A1-A3:	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**6.25E+00**
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E+00
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.88E-04
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-02
Total Cradle-to-Grave:	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.17E+00**

Table 17: Use of Secondary Resources

Renewable and Non-Renewable Energy by Source

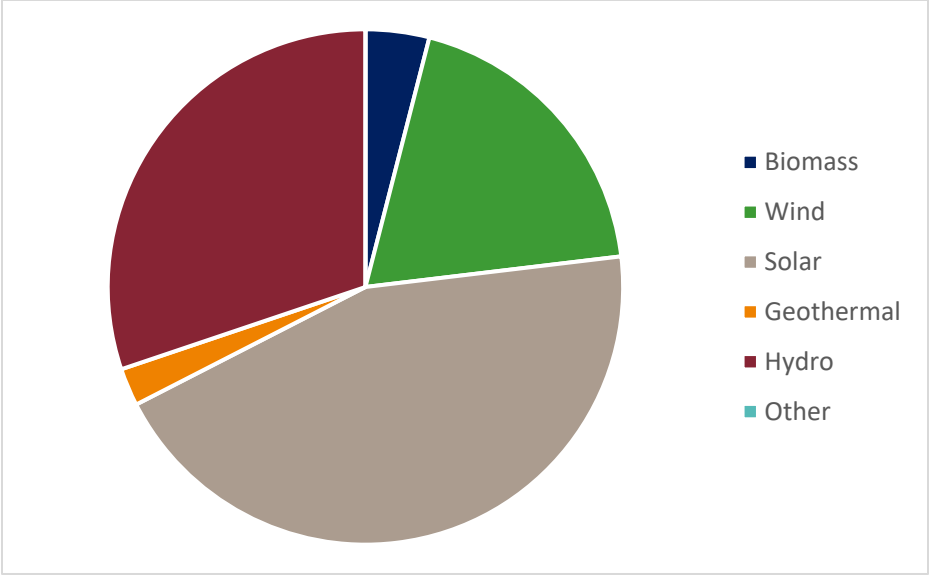

Figure 5: Renewable Energy by Source

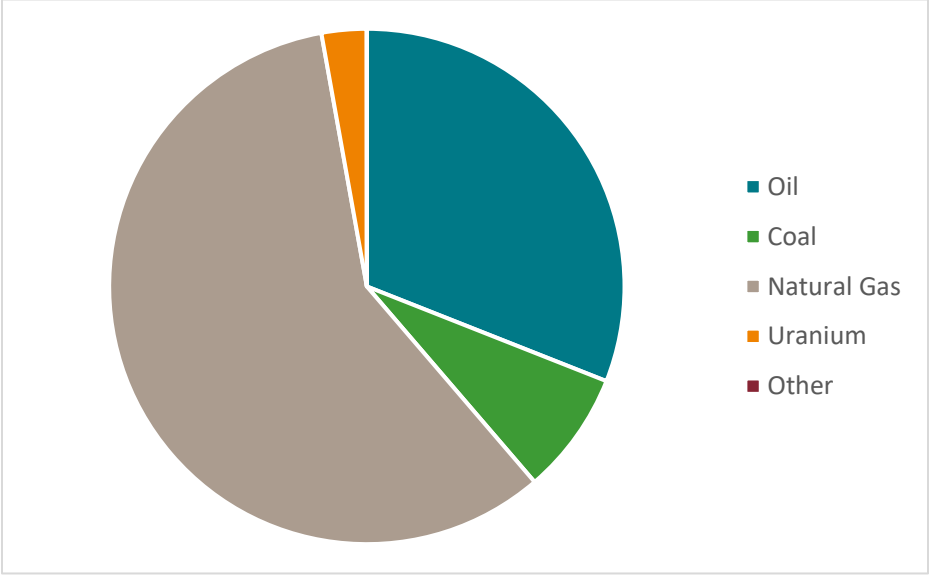

Figure 6: Non-Renewable Energy by Source

Waste Flows

Waste Flows				
	Hazardous waste disposed	*Non-hazardous waste disposed*	*High level radioactive waste, conditioned, to final repository*	*Intermediate and low level radioactive waste, conditioned, to final repository*
	kg	*kg*	*kg*	*kg*
Raw Materials (A1)	1.14E-02	5.41E+00	4.99E-05	1.25E-03
Raw Material Transport (A2)	1.22E-06	2.31E-02	1.59E-06	4.34E-05
Manufacture (A3)	1.34E-06	5.39E+00	8.98E-06	2.44E-04
Total A1-A3:	**1.14E-02**	**1.08E+01**	**6.05E-05**	**1.54E-03**
Final Product Transport (A4)	1.07E-05	4.47E-02	1.70E-06	4.56E-05
Installation (A5)	1.54E-06	1.20E+02	1.38E-05	3.86E-04
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	2.09E-08	1.03E-02	1.49E-07	4.06E-06
Waste Transport (C2)	1.25E-06	5.23E-03	1.98E-07	5.34E-06
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	4.69E-06	1.05E+03	6.93E-06	1.82E-04
Total Cradle-to-Grave:	**1.15E-02**	**1.18E+03**	**8.33E-05**	**2.16E-03**

Table 18: Waste Flows

Output Material Flows

Output Material Flows				
	Components for reuse	*Materials for recycling*	*Materials for energy recovery*	*Recovered energy exported*
	kg	*kg*	*kg*	*kg*
Raw Materials (A1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Raw Material Transport (A2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manufacture (A3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total A1-A3:	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
Final Product Transport (A4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Installation (A5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use (B1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Maintenance (B2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Repair (B3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Replacement (B4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Refurbishment (B5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Energy Use (B6)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Operational Water Use (B7)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deconstruction (C1)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Transport (C2)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste Processing (C3)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of Life Disposal (C4)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Cradle-to-Grave:	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**

Table 19: Output Material Flows

CertainTeed SAINT-GOBAIN

GlasRoc Sheathing 5/8" Gypsum Board
Seattle, WA

According to ISO 14025/44/40 Series and ISO 21930

LCA 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 37% of the cradle-to-grave environmental impact potentials for CertainTeed GlasRoc Sheathing 5/8" Gypsum Boards at the Seattle, WA 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

Environment and Health During Manufacture

CertainTeed and Saint-Gobain have well-established Environmental, Health, and Safety (EHS) and product stewardship programs, which help to enforce proper evaluation and monitoring of chemicals and raw materials 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.

The Seattle, WA CertainTeed Gypsum manufacturing facility operates integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Further Information

https://www.certainteed.com/drywall/

LCA Development

This EPD and the corresponding LCA were prepared by Saint-Gobain Corporation North America in Malvern, PA.

References

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- Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products. April 23, 2020. NSF International.
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- EN 15804 – Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products
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- GaBi Ecoinvent Database. www.thinkstep.com
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