

SmartEPD-2024-050-0221-01

CertaPro Commercial Board and Rigid Liner Board

Date of Issue

Dec 30, 2024

Expiration date

Dec 30, 2029

Last updated

Apr 15, 2025

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

General Information

CertainTeed

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



Product Name:	CertaPro Commercial Board and Rigid Liner Board
Declared Unit:	1 m2
Declaration Number:	SmartEPD-2024-050-0221-01
Date of Issue:	December 30, 2024
Expiration:	December 30, 2029
Last updated:	April 15, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4
Market(s) of Applicability:	North America

General 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.certainteed.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 products 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:	UL Part A PCR for Building-Related Products and Services v.4 Date of issue: March 01, 2022

Sub-category PCR:	UL Part B: Building Envelope Thermal Insulation Products Date of issue: April 10, 2023 Valid until: October 10, 2024
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	 Saint-Gobain North American ESG Sustainability Group  sustainability@saint-gobain.com
EPD Program Operator:	 Smart EPD  info@smartepd.com  www.smartepd.com  585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External  Lucas Pedro Berman  Senda - Consultoria Ambiental & Energetica  info@sendaconsultorias.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External  Lucas Pedro Berman  Senda - Consultoria Ambiental & Energetica  info@sendaconsultorias.com

Product Information

Declared Unit:	1 m2
Mass:	1.6 kg
Reference Service Life:	75 Years
Product Specificity:	 Product Average  Product Specific

Product Description

CertainTeed's CertaPro Commercial Board is a high-performance thermal insulation product designed for commercial use. It is available unfaced, for use where an exterior finish will be applied, or faced with a vapor retardant finish in either a clean metallic (FSK) or attractive white (ASJ) surface. The insulation is easy to install and is available in various thicknesses, making it ideal for walls, roofs, and mechanical equipment applications. It's sustainable, low-VOC, and an excellent choice for buildings located in areas with extreme temperature conditions.

Rigid Liner Board with ToughGard Facing is a high-quality acoustical and thermal board-type insulation used primarily for lining the interior of HVAC sheet metal ducts and plenums to absorb unwanted crosstalk, equipment and air rush noise. This product performs in most types of heating and cooling systems operating at velocities up to 6,000 fpm (30.5 m/s) and temperatures to 250F (121C).

Further information can be found at: <https://www.certainteed.com/products/technical-insulation-products/certapro-commercial-board>
<https://www.certainteed.com/products/technical-insulation-products/rigid-liner-board-toughgard-facing>

Product Specifications

Product Classification Codes: EC3 - ThermalMoistureProtection -> Insulation -> BoardInsulation
 UNSPSC - 31371001

Form Factor: ThermalMoistureProtection >> Insulation >> BoardInsulation

Insulation type: Fiberglass

Density: 31.37 kg/m3

Thickness for RSI =1: 33.20 mm

Material Composition

Material/Component Category	Origin	% Mass
External Glass Cullet - Externally Sourced Recycled Content (Secondary Material)	None	48 - 58
Borax	None	6 -12
Manganese Dioxide	None	0.01 - 0.03
Nepheline	None	2 - 4
Silane	None	0.01 – 0.1
Soda Ash	None	1 - 3
Sodium Nitrate	None	0.01 – 1
Water Repellent - silicone	None	0.01 – 0.05
Wax	None	0.01 – 2
Internal Glass Cullet - Reprocessed within the manufacturing plant	None	14 – 24
Phenolic Resin	None	2 – 6
Water	None	2 – 8
FSK R-3035 BW Facing	None	2 – 6
RLB Manniglas 1709 Black	None	2 – 6
ASJ 30J BW	None	2 – 6

Packaging Material	Origin	kg Mass
Plastic bag (shrink film)	None	5.97E-02
Stretch film	None	8.34E-02
Strapping	None	7.82E-03
Pallets	None	8.64E-02
Corrugated Cardboard	None	5.17E-02
Corrugated Edgeboard	None	2.99E-03

Biogenic Carbon Content	kg C per m2
Biogenic carbon content in product	0.0131
Biogenic carbon content in accompanying packaging	0.032

Hazardous Materials
No substances required to be reported as hazardous are associated with the production of this product.

EPD Data Specificity

- Primary Data Year:2023
- Manufacturing Specificity:

✗

 Industry Average

✗

 Manufacturer Average

✓

 Facility Specific

Averaging:
A weighted average was completed for this EPD. A sensitivity analysis was completed to ensure the products included in the grouping differ by no more than 10% for any environmental impact indicator

System Boundary

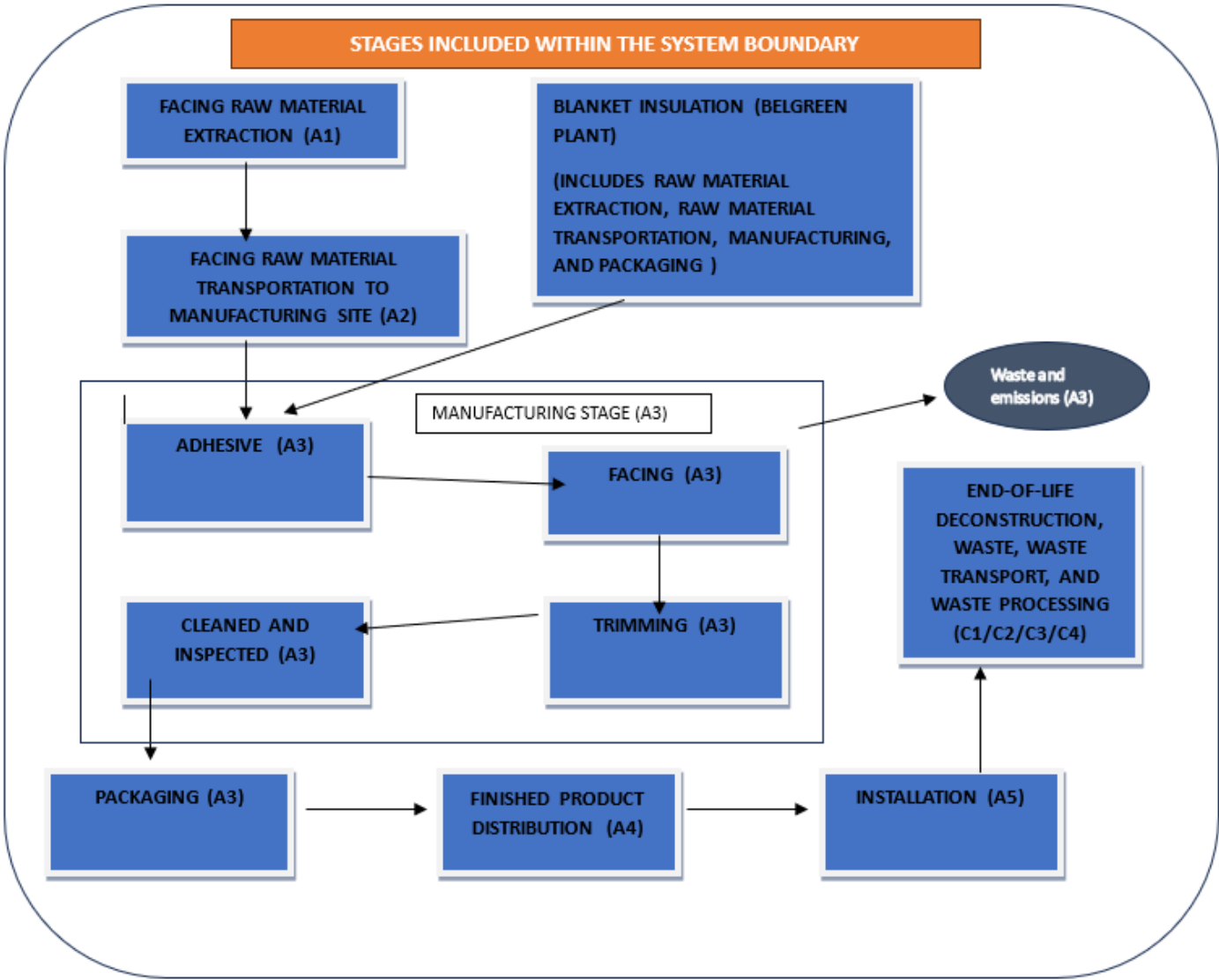
Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction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

Plants

 CertainTeed Insulation - Belgreen Drive, Ontario
3985 Belgreen Drive, Ottawa, ON, Canada

 CertainTeed Insulation - Johnston Road, Ontario
1365 Johnston Road, Ottawa, ON K1V 8Z1, Canada

Product Flow Diagram



Software and Database

LCA Software:	Sphera LCA for Experts (formerly GaBi) v. 10.8
LCI Foreground Database(s):	GaBi Professional Database v. 2022
LCI Background Database(s):	Ecoinvent v. 3.9.1

Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. Since the inventory flows for the utilized databases are very often accompanied by a series of data quality ratings, a general indication of precision can be inferred. Using these ratings, the data sets used generally have medium-to-high precision.

The Saint-Gobain North American ESG Department has collected specific data on energy and material inputs, wastes, water use, emissions, and transportation impacts for included manufacturing plant(s).

Life Cycle Module Descriptions

This LCA study is characterized as a cradle to gate with other options study, examining the Commercial Board and Rigid Liner Board Insulation, product lines from raw material extraction through to final disposal.

For this life cycle assessment, the Saint-Gobain North America (SGNA) ESG department, with assistance from personnel at the manufacturing locations, collected specific data on energy and material inputs, wastes, water usage, emissions, and transportation impacts for the CertainTeed Commercial Board and Rigid Liner Board Insulation, in Ottawa, ON for the calendar year 2023. Please note that both manufacturing sites (Belgreen Drive and Johnston Road) are in Ottawa, ON, located only 7 km away from each other.

Raw Materials (Module A1)

A thorough analysis of the material inputs was completed for the inventory of this study.

The board insulation (without facing) is produced at the Belgreen plant, packaged, then transported to the Johnston plant where the facing is then applied, packaged, and the finished commercial board is shipped to our customers. To be as accurate as possible, all relevant data was received from the Belgreen plant for the board insulation (e.g., raw material extraction, raw material transportation, manufacturing, packaging, and waste). Since the board insulation is considered a raw material, this was included within Module A1.

Transportation of raw materials (Module A2)

Raw materials are transported to the manufacturing sites by standard freight truck, train, or ocean freighters. Unless otherwise noted, transport vehicles are fueled with diesel fuel. The Raw material transportation distance were modeled based on the actual data provided by experts from the plant.

Manufacturing (Module A3)

A process flow diagram is attached which illustrates all process steps, inputs, outputs including material and waste. To produce the faced (FSK, ASJ) Commercial Board and Rigid Board Liner products, the board insulation is fed onto a conveyor with the smooth surface facing up. An adhesive is then sprayed onto the smooth side of the board. A facing material is then laminated to the surface using a slight compression to initiate the bond. Each individual faced board is then separated and conveyed into the trimming section where it is sized as per product specification. On the exit of the trimming section the finished product is cleaned and inspected for defects. All waste generated from the cutting process is removed using a dust collection system which is collected in a compactor and sent to landfill. Any waste plastic packaging and board material from any raw materials is sent to landfill and any cardboard is recycled.

Packaging (Module A3)

Packaging of the final product after production is included in the life cycle assessment. All 2'x4' finish commercial faced board (FSK, ASJ) and RLB products are protected on each side with a corrugated sleeve then secured within the sleeve using a plastic shrink film. The finished cartons are then stacked on 4'x4' wood pallets with 2 corner boards placed on the top of each pallet and all cartons secured to the pallet using 2 bands of plastic strapping. For all 4'x5', 4'x8' and 4'x10' faced material the product is placed on the appropriately sized wood pallet. All 4 outer corners are protected with a corrugated corner board. A plastic bag is then placed over the entire product and is secured onto the pallet using plastic stretch wrap.

Transport from the gate to the site (Module A4)

Final products are transported on trucks throughout the United States and Canada. This study assumed an average of 450 km for the final shipment of product based on assumptions from the plant team based on transport data.

Installation (Module A5)

No auxiliary materials were included in this LCA, a baseline scenario with 5% installation waste was included. Depending on the use of the product, there are different ways to install the board. The different installation practices are explained in this section as a guideline for contractors.

Exterior Walls: The faced side of the board should be installed toward the interior side of the structure, except in warm and humid areas where local code regulations may require a vapor retarder to face toward the exterior.

Curtain Walls: CertaPro Board is applied to spandrel and pre-cast concrete panels with approved adhesives or mechanical fasteners. Boards may also be installed using hat channels or Z studs. Where a vapor retarder is required, all joints, seams and penetrations must be sealed. Exterior applications require the insulation to be covered

with appropriate weather barrier finish in addition to the factory applied vapor retarder facing. Choice of finish depends on mechanical abuse, weather exposure and appearance requirements. These materials were not included within the analysis.

HVAC/Mechanical: All fabrication, application and installation steps should be in accordance with the requirements of the National Commercial and Industrial Installation Standards (current edition) published by the Midwest Insulation Contractors Association (MICA). These installation recommendations are general in nature. Other methods are acceptable. Please consult your contractor for recommendations best suited to the application.

Rigid Liner Board with ToughGard Facing should be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C916. The adhesive film coverage should be a minimum 90% of the metal surface. The product should additionally be secured, as required, to the sheet metal ductwork using mechanical fasteners (impact-driven or weld-secured). These fasteners vary in type and length. Fastener length should be such that the Rigid Liner Boards thickness is compressed no more than 10% of its design thickness. Maximum fastener spacing should be in accordance with NAIMA or SMACNA guidelines. Rigid Liner Board with ToughGard Facing fabricated duct sections should be kept clean and dry from the point of fabrication through job site installation. Special precautions at the job site may be necessary to accomplish this. The installed lined ductwork should be protected to avoid contamination by water and dirt. An HVAC system commissioning program should be considered to ensure proper start-up and purging of the duct system.

Use (Modules B1-B7)

The use phase was not included within the LCA.

End of Life (Modules C1-C4)

This study assumes a 5% scrap rate generated from the installation of the product. In addition, disposal of the packaging material is included in the installation phase. Just as the installation of the Commercial Board and Rigid Liner Board is done by hand, the deconstruction (module C1) is also assumed to be by hand, so this study assumes the deconstruction module of the end-of life stage to be burden free. T

Product loss per functional unit was generated by calculating the total scrap rate for each product. The waste materials at the construction site before waste processing includes the product loss per functional unit and packaging waste. Within the LCA FE model, transportation of installation waste and disposal of packaging and product loss were included within this study. All installation waste disposal is based off Part A (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) guidance.

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. Allocation was conducted based on the production mass data provided by the two facilities. A sum of the impacts from the two facilities was performed to represent a product total for the raw materials, raw material transportation, and manufacturing processes.

Cut-off Procedure

All inputs and outputs to a process shall be included in the calculation of results, for which data are available. Any data gaps are filled by conservative assumptions with average, generic, or proxy data. 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:	30 l/100km
Vehicle Type:	Truck
Transport Distance:	450 km
Capacity Utilization:	85 %
Packaging Mass:	1.82E-01 kg
Gross density of products transported:	56.06 kg/m ³
Capacity utilization volume factor:	<1
Assumptions for scenario development:	

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	5 %
Ancillary Materials:	0 kg
Product Lost per Declared/Functional Unit:	7.44E-02 kg
Waste Materials at the Construction Site Before Waste Processing:	3.31E-01 kg
Mass of Packaging Waste Specified by Type:	1.06E-01 (plastics); 1.45E-01 (other materials) kg
Biogenic Carbon Contained in Packaging:	8.75E-03 kg

Assumptions for scenario development:	This study assumes a 5% scrap rate generated from the installation of the product. In addition, disposal of the packaging material is included in the installation phase. Product loss per declared unit was generated by calculating the total scrap rate for each product. The waste materials at the construction site before waste processing includes the product loss per declared unit and packaging waste. Within the LCA FE model, transportation of installation waste and disposal of packaging and product loss were included within this study. All installation waste disposal is based off Part A (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) guidance. Exterior Walls: The faced side of the board should be installed toward the interior side of the structure, except in warm and humid areas where local code regulations may require a vapor retarder to face toward the exterior. Curtain Walls: CertaPro Board is applied to spandrel and pre-cast concrete panels with approved adhesives or mechanical fasteners. Boards may also be installed using hat channels or Z studs. Where a vapor retarder is required, all joints, seams and penetrations must be sealed. Exterior applications require the insulation to be covered with appropriate weather barrier finish in addition to the factory applied vapor retarder facing. Choice of finish depends on mechanical abuse, weather exposure and appearance requirements. HVAC/Mechanical: All fabrication, application and installation steps should be in accordance with the requirements of the National Commercial and Industrial Installation Standards (current edition) published by the Midwest Insulation Contractors Association (MICA). These installation recommendations are general in nature. Other methods are acceptable. Please consult your contractor for recommendations best suited to the application. Rigid Liner Board with ToughGard Facing should be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C916. The adhesive film coverage should be a minimum 90% of the metal surface. The product should additionally be secured, as required, to the sheet metal ductwork using mechanical fasteners (impact-driven or weld-secured). These fasteners vary in type and length. Fastener length should be such that the Rigid Liner Board's thickness is compressed no more than 10% of its design thickness. Maximum fastener spacing should be in accordance with NAIMA or SMACNA guidelines. Rigid Liner Board with ToughGard Facing fabricated duct sections should be kept clean and dry from the point of fabrication through job site installation. Special precautions at the job site may be necessary to accomplish this. The installed lined ductwork should be protected to avoid contamination by water and dirt. An HVAC system commissioning program should be considered to ensure proper start-up and purging of the duct system.
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End of Life (C1 - C4)
C1 - C4 Modules

Recovery

Recycling: 1.12E-01 kg

Disposal

Product or Material for Final Disposal: 1.49E+00 kg
Removals of Biogenic Carbon: 1.31E-02 kg CO2

Assumptions for scenario development:	This study assumes a product service life of 75 years. The selected service life used in this study reflects the expert opinion of the product manufacturer and the building service life indicated in the PCR. All end-of-life disposal is based off Part A (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) guidance.
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Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1, CML 2016 v4.8

per 1 m2 of product .

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

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
GWP-total [including biogenic carbon]	IPCC AR5 GWP 100	kg CO2 eq	2.67e+0	6.75e-2	1.33e-1	ND	7.49e-3	ND	3.94e-2
GWP-fossil [excluding biogenic carbon]	IPCC AR5 GWP 100	kg CO2 eq	2.81e+0	6.75e-2	1.14e-1	ND	7.49e-3	ND	3.95e-2
ODP	TRACI 2.1	kg CFC 11 eq	7.87e-7	1.58e-12	3.33e-13	ND	2.80e-13	ND	1.23e-13
AP	TRACI 2.1	kg SO2 eq	4.12e-3	2.51e-4	3.45e-4	ND	4.44e-5	ND	1.28e-4
EP	TRACI 2.1	kg N eq	1.87e-3	1.39e-5	1.07e-4	ND	2.46e-6	ND	5.75e-6
POCP	TRACI 2.1	kg O3 eq	7.39e-2	6.90e-3	2.21e-3	ND	1.22e-3	ND	2.48e-3
ADP-fossil	CML 2016 v4.8	MJ	2.86e+1	5.32e-1	1.55e-1	ND	9.43e-2	ND	3.49e-1

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 product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
PERE	MJ	ND	ND	ND	ND	ND	ND	ND
PERM	MJ	ND	ND	ND	ND	ND	ND	ND
PERT	MJ	ND	ND	ND	ND	ND	ND	ND
PENRE	MJ	ND	ND	ND	ND	ND	ND	ND
PENRM	MJ	ND	ND	ND	ND	ND	ND	ND
PENRT	MJ	ND	ND	ND	ND	ND	ND	ND
RPRE	MJ	1.04e+1	ND	5.43e-3	ND	ND	ND	3.94e-2
RPRM	MJ	1.33e+0	ND	ND	ND	ND	ND	ND
RPRT	MJ	ND	ND	ND	ND	ND	ND	ND
NRPRE	MJ	4.21e+1	5.37e-1	1.57e-1	ND	5.97e-2	ND	ND
NRPRM	MJ	3.78e+0	ND	ND	ND	ND	ND	ND
NRPRT	MJ	ND	ND	ND	ND	ND	ND	ND
ADP-fossil	MJ	ND	ND	ND	ND	ND	ND	ND
SM	kg	7.18e-1	ND	ND	ND	ND	ND	ND
RSF	MJ	0	ND	ND	ND	ND	ND	ND
NRSF	MJ	0	ND	ND	ND	ND	ND	ND
FW	m3	1.47e-2	ND	1.22e-5	ND	ND	ND	4.11e-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, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
HWD	kg	1.79e-8	ND	1.08e-11	ND	ND	ND	7.85e-11
NHWD	kg	2.48e-1	ND	1.16e-1	ND	ND	ND	9.71e-1
RWD	kg	ND	ND	ND	ND	ND	ND	ND
HLRW	kg	5.56e-6	ND	5.21e-10	ND	ND	ND	3.78e-9
ILLRW	kg	4.62e-3	ND	4.65e-7	ND	ND	ND	3.37e-6
CRU	kg	ND	ND	ND	ND	ND	ND	ND
MFR	kg	ND	ND	ND	ND	ND	ND	ND
MER	kg	ND	ND	ND	ND	ND	ND	ND
MNER	kg	ND	ND	ND	ND	ND	ND	ND
EEE	MJ	ND	ND	ND	ND	ND	ND	ND
EET	MJ	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 1 m2 of product .

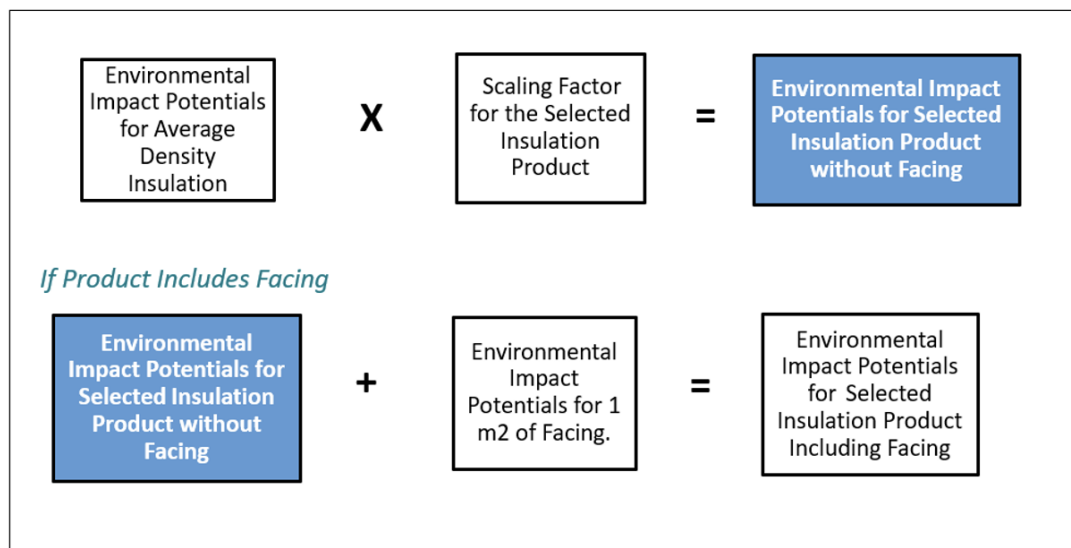
Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4
BCRP	kg CO2	0	ND	ND	ND	ND	ND	ND
BCEP	kg CO2	0	ND	ND	ND	ND	ND	ND
BCRK	kg CO2	-5.13e-3	ND	ND	ND	ND	ND	ND
BCEK	kg CO2	0	ND	5.13e-3	ND	ND	ND	ND
BCEW	kg CO2	0	ND	ND	ND	ND	ND	ND
CCE	kg CO2	0	ND	ND	ND	ND	ND	ND
CCR	kg CO2	0	ND	ND	ND	ND	ND	ND
CWNR	kg CO2	ND	ND	ND	ND	ND	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:
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

Type	Thermal Resistance (R-Value)	Scaling Factor
CB 250	4.20	0.64
CB 250	8.30	1.28
CB 300	4.30	0.77
CB 300	6.50	1.15
CB 300	8.70	1.53
CB 300	10.90	1.91
CB 300	13.00	2.30
CB 300	15.20	2.68
CB 300	17.40	3.06

$$\begin{array}{|c|} \hline 2.92 \text{ kg CO}_2 \text{ eq} \\ \text{per } 1 \text{ m}^2\text{K/W} \\ \text{(Environmental} \\ \text{Impact of Basis} \\ \text{Product)} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1.53 \\ \text{(Scaling factor} \\ \text{for R-8.70)} \\ \hline \end{array} + \begin{array}{|c|} \hline 0.01 \text{ kg CO}_2 \text{ eq} \\ \text{(Environmental} \\ \text{Impact of FSK} \\ \text{Facing)} \\ \hline \end{array} = \begin{array}{|c|} \hline 4.48 \text{ kg CO}_2 \text{ eq} \\ \text{(Total} \\ \text{Environmental} \\ \text{Impact for R-8.70)} \\ \hline \end{array}$$

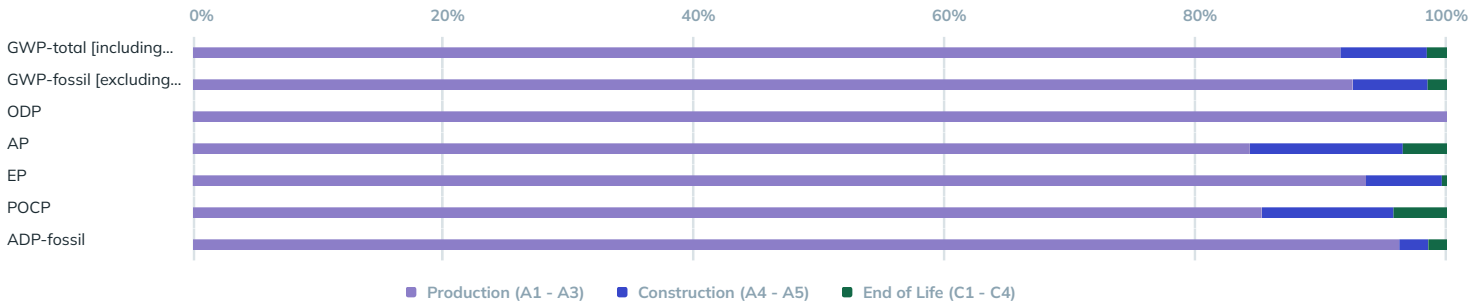


Interpretation

Based on the results from the life cycle assessment, the life cycle impacts are strongly driven by the raw materials (A1) more specifically the board insulation made at the Belgreen plant. This board insulation is produced at the Belgreen plant, then transported to the Johnston plant, where the facing is added to complete the Commercial Board product. Identifying ways to reduce the consumption of natural gas, or switching to renewable energy would help lower the overall global warming potential.

Within the raw materials used to produce the board insulation at the Belgreen plant, Borax is the highest contributor to the raw material impacts. If possible, incorporating more recycled content into the content and reducing the use of borax will help reduce the environmental impacts of the raw materials stage in the life cycle of the product. Although this insulation already has a high amount of recycled content, increasing it as much as possible would be beneficial. As recycled content increases, the raw materials driving impacts will decrease, thus improving the overall environmental impacts.

Within the manufacturing stage (A3), reducing scrap from the production of facing would decrease the global warming potential from manufacturing. Identifying where and why there is scrap and implementing measures to recycle the facing would be encouraged.



Modified Impact Results: Renewable Electricity per 1 m2 of product .

Impact Category	Unit	Method	A1A2A3	A4	A5	C1	C2	C3	C4
GWP-total	kg CO2 eq	IPCC AR5 GWP 100	2.66e+0	6.75e-2	1.33e-1	ND	7.49e-3	ND	3.94e-2
ODP	kg CFC 11 eq	TRACI 2.1	7.88e-7	1.58e+0	3.33e-13	ND	2.80e-133	ND	1.23e-13
AP	kg SO2 eq	TRACI 2.1	4.12e-3	2.51e-4	3.45e-4	ND	4.44e-5	ND	1.28e-4
EP	kg N eq	TRACI 2.1	1.87e-3	1.39e-5	1.07e-4	ND	2.46e-6	ND	5.75e-6
POCP	kg O3 eq	TRACI 2.1	7.38e-2	6.90e-3	2.21e-3	ND	1.22e-3	ND	2.48e-3
ADP-fossil	MJ	TRACI 2.1	2.85e+1	5.32e-1	1.55e-1	ND	9.43e-2	ND	3.49e-1
GWP-fossil	kg CO2 eq	IPCC AR5 GWP 100	2.81e+0	6.75e-2	1.14e-1	ND	7.49e-3	ND	3.95e-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 the Belgreen and Johnston sites were calculated using 100% wind-generated electricity, covering 18% of the Johnston plants electricity consumption in 2023 and covering 28% of the Belgreen plants 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).* GWP IPCC AR5 (excluding biogenic carbon)

Further Information

TOUGHGARD Facer Environmental Impacts

Environmental Impact Indicator	TOUGHGARD Facer (per m2)
IPCC AR5 GWP100 incl biogenic carbon - kg CO2 eq	3.91E-03
IPCC AR5 GWP100 excl biogenic carbon - kg CO2 eq	3.91E-03
TRACI 2.1 ODP - kg CFC 11 eq	1.73E-09
TRACI 2.1 AP - kg SO2 eq	2.32E-05
TRACI 2.1 EP - kg N eq	9.27E-07
TRACI 2.1 POCP - kg O3 eq	1.61E-04
CML2001 ADP fossil - MJ	5.36E-02
FW - m3	1.71E-05

HWD - kg	1.55E-11
NHWD - kg	4.57E-04
HLRW - kg	2.73E-09
ILLRW - kg	2.28E-06

ASJ Facer Environmental Impacts

Environmental Impact Indicator	ASJ Facer (per m2)
IPCC AR5 GWP100 incl biogenic carbon - kg CO2 eq	1.42E-02
IPCC AR5 GWP100 excl biogenic carbon - kg CO2 eq	1.58E-02
TRACI 2.1 ODP - kg CFC 11 eq	2.88E-11
TRACI 2.1 AP - kg SO2 eq	9.04E-05
TRACI 2.1 EP - kg N eq	4.07E-05
TRACI 2.1 POCP - kg O3 eq	1.19E-03
CML2001 ADP fossil - MJ	2.24E-01
FW - m3	2.19E-03
HWD - kg	4.63E-10
NHWD - kg	2.05E-03
HLRW - kg	6.24E-09
ILLRW - kg	5.52E-06

FSK Facer Environmental Impacts

Environmental Impact Indicator	FSK Facer (per m2)
IPCC AR5 GWP100 incl biogenic carbon - kg CO2 eq	1.11E-02
IPCC AR5 GWP100 excl biogenic carbon - kg CO2 eq	1.18E-02
TRACI 2.1 ODP - kg CFC 11 eq	3.08E-11
TRACI 2.1 AP - kg SO2 eq	7.17E-05
TRACI 2.1 EP - kg N eq	2.82E-05
TRACI 2.1 POCP - kg O3 eq	1.08E-03
CML2001 ADP fossil - MJ	1.79E-01
FW - m3	1.04E-03
HWD - kg	3.02E-10
NHWD - kg	1.32E-03
HLRW - kg	3.74E-09
ILLRW - kg	3.43E-06

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