

Declaration Owner
Owens Corning Insulating Systems, LLC
One Owens Corning Parkway, Toledo, OH, USA
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Products
QuietR® Duct Board

Declared Unit
1 m² of insulation

EPD Number and Period of Validity
SCS-EPD-10299
EPD Valid December 9, 2024 through December 8, 2029

Product Category Rule
PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. March 2022.

PCR Guidance for Building-Related Products and Services Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements. Version 1.0. September 2019.

Program Operator
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Declaration Owner:	Owens Corning Insulating Systems, LLC
Address:	One Owens Corning Parkway, Toledo, OH, USA
Declaration Number:	SCS-EPD-10299
Declaration Validity Period:	December 9, 2024 through December 8, 2029
Product:	QuietR® Duct Board
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
Declared Unit:	1 m^2 of insulation
RSL:	75 Years
Market of Applicability:	North America
EPD Type:	Product-specific
Range of Dataset Variability:	N/A
EPD Scope:	Cradle to gate with options (A1-A5, C2, C4)
Reference Year of Manufacturer Data:	2023
LCA Practitioner:	Aspire Sustainability LLC
LCA Software:	SimaPro 9.5.0.0
LCI Database:	EcoInvent 3.10.0
LCIA Methodology:	TRACI 2.1 v1.09; CML I-A baseline v4.7; IPCC (2013)
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Abby Martell, SCS Global Services
Part A Product Category Rule:	PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. UL Environment. Mar. 2022.
PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements. Version 1.0. September 2019.
Part B PCR Review conducted by:	Hugues Imbeault-Tetreault (Chair), Group AGECO; Thomas Gloria, Industrial Ecology Consultants; Andre Omer Desjarlais, Oak Ridge National Laboratory
Independent verification of the declaration and data, according to ISO 14025, ISO 21930, and the PCR	☐ internal ☒ external
EPD Verifier:	Abby Martell, SCS Global Services
Declaration Contents:	1.About Company Name ..... 2 2.Product ..... 2 3. LCA: Calculation Rules ..... 5 4. LCA: Scenarios and Additional Technical Information ..... 10 5. LCA: Results ..... 15 6. LCA: Interpretation ..... 20 7. Additional Environmental Information ..... 20 8. References 23

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and 21930.*
Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*
Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*
Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works. The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.*

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1. About Owens Corning

Founded in 1938, Owens Corning is a global building and construction materials leader committed to building a sustainable future through material innovation. Our four integrated businesses – Composites, Doors, Insulation, and Roofing – provide durable, sustainable, energy-efficient solutions that leverage our unique material science, manufacturing, and market knowledge to help our customers win and grow.

This Environmental Product Declaration is representative of the products produced at the location listed below.

Waxahachie Plant
Waxahachie, TX 75165

2. Product

2.1 Product Identification and Specification

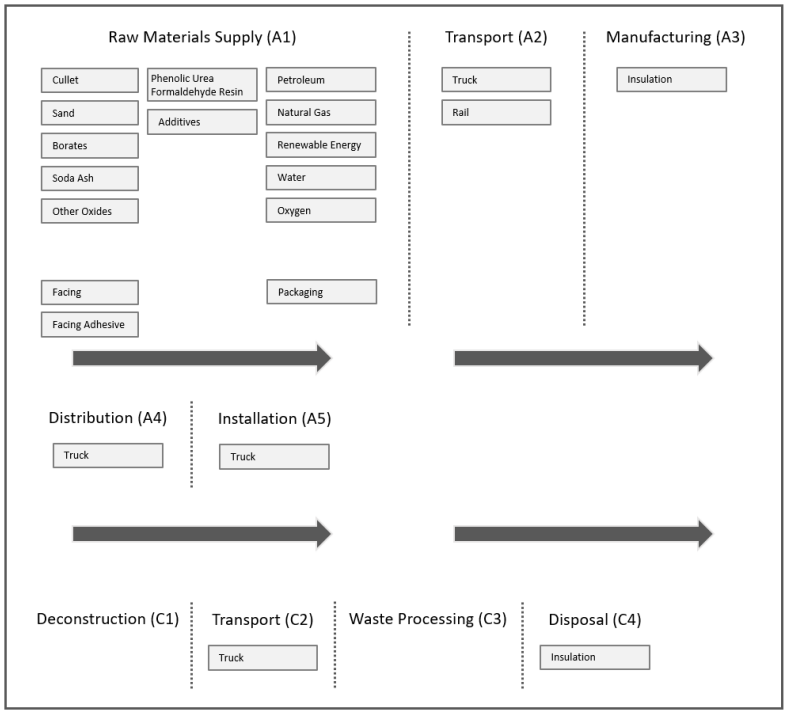
QuietR® Duct Board is a rigid, resin bonded fibrous glass board with a tough, damage-resistant, flame retardant, reinforced aluminum foil (FRK) facing. A durable mat is applied to the side opposite the FRK facing to provide an air stream surface.



The Construction Specification Institute (CSI) codes covered by the subcategory PCR applicable to QuietR® Duct Board are listed below.

- 07 21 00
  - 07 21 13 Board Insulation
- 23 07 00 HVAC Insulation
  - 23 07 13 Duct Insulation

2.2 Flow Diagram



2.3 Product Average

This Environmental Product Declaration reflects production of QuietR® Duct Board at a single Owens Corning site, located in Waxahachie, TX, USA.

2.4 Application

QuietR® Duct Board is used to fabricate components for indoor commercial and residential heating, ventilating and air conditioning duct systems operating at static pressures to ±2 in. w.g. (500 Pa), internal air temperatures 40°F (4°C) to 250°F (121°C), and air velocities to 6,000 fpm (30.5 m/s). Straight duct sections, elbows, tees, offsets and other system elements can quickly and easily be fabricated at the shop or on the job and assembled into a complete air distribution system using these lightweight, thermally efficient boards.

2.5 Material Composition

QuietR® Duct Board insulation consists of the glass fiber, binder system, an FRK (Foil Reinforced Kraft) facing, and nonwoven airstream mat. The fiberglass is made from various inorganic materials, which are referred to as batch minerals and are adhered with the binder materials. The use of glass cullet in the batch results in recycled content in the final products – actual recycled content amounts are available through the SCS Global Services Certified Green Products Guide (https://www.scsglobalservices.com/certified-green-products-guide).

Table 1. *Batch and Binder Composition*

Component	Composition % (by Mass)
Batch	
Cullet	25-75%
Sand	25-50%
Borates	<5%
Soda Ash	<5%
Other Oxides	1-2%
Binder	
Phenol Urea Formaldehyde Resin	<10%
Additives	<1%
Facing	
Aluminum Foil (Exterior Layer)	<1%
Elastomeric Polymer (Barrier Coating)	<1%
Fiberglass (Reinforcement)	<1%
Emulsion (Adhesive)	<1%
Natural Kraft (Interior Layer)	<1%
Fiberglass Mat (Airstream Surface)	<1%

*No substances required to be reported as hazardous or substances of very high concern are associated with the production of this product.

2.6 Technical Data

The following table provides technical specifications for QuietR® Duct Board insulation.

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Table 2. *Physical properties*

Property	Test Method	Result
Maximum operating temperature limits	UL 181/ULC S110	Internal: 250°F (121°C) External: 150°F (66°C)
Maximum air velocity	UL 181/ULC S110 Erosion Test	6,000 fpm (30.5 m/s)
Static pressure limit	UL 181/ULC S110	±2 in. w.g. (500 Pa)
Water vapor sorption	ASTM C 1104	<3% by weight at 120°F (49°C), 95% R.H.
Mold growth	UL 181/ULC S110	Meets requirements
Fungi resistance	ASTM G21	Meets requirements
Bacteria resistance	ASTM G22	Meets requirements
Surface burning characteristics[1] Flame spread Smoke developed	UL 723/ULC S102	 <25[1] <50
Fire retardancy	UL 181/ULC S110	Flame penetration 30 min

[1]The surface burning characteristics of this product have been determined in accordance with UL 723/ULC S102. This standard should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a risk assessment which takes into account all the factors which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest five rating.

Table 3. *Thermal performance*

At 75°F (24°C) Mean Temperature	1" (25 mm)	1½" (38 mm)	2" (51 mm)
R-value, hr·ft2·°F/Btu (RSI, m2·°C/W)	4.30 (0.76)	6.50 (1.15)	8.70 (1.53)
k-value, Btu·in/hr·ft2·°F (W/m·°C)	0.23 (0.033)	0.23 (0.033)	0.23 (0.033)
C-value, Btu/hr·ft2·°F (W/m2·°C)	0.23 (1.32)	0.16 (0.87)	0.12 (0.65)

Mean temperature is the average of two temperatures: that of the air inside the duct and that of the ambient air outside it.
Note: Specified design thickness should be adequate to prevent exterior surface condensation.

Table 4. *Acoustical performance*

Thickness	125	250	500	1000	2000	4000	NRC
1"	0.10	0.24	0.74	1.02	1.06	1.06	0.75
1½"	0.15	0.42	1.03	1.12	1.07	1.06	0.90
2"	0.15	0.77	1.19	1.16	1.05	1.06	1.05

These data were collected using a limited sample size and are not absolute values. Therefore, reasonable tolerances must be applied.
Tests were conducted in accordance with ASTM C423, Mounting A (material applied against a solid backing).

Standards, Codes Compliance

- Meets UL 181 Class 1 Air Ducts
- Meets NFPA 90A/90B
- Meets ICC International Mechanical Code, Corps of Engineers Guide Spec.
- Supported by NAIMA and SMACNA industry standards
- Meets requirements of UL 181 and ASTM C1338 (mold growth), ASTM G21 (fungi test) and ASTM G22 (bacteria test)

Additional Technical Information

National Fire Protection Association Standards NFPA 90A and 90B for air conditioning and ventilating systems require air ducts to be Class 0 or 1. The tests set stringent requirements on fire safety as well as ruggedness. To meet Class 1 air duct requirements, the system must withstand UL 181/ULC S110 tests such as erosion, pressure loss, impact, collapse, puncture, static load and fire retardance (30-minute flame penetration test). Also, to qualify as a Class 1 Air Duct System, the following UL 723/ULC S102 fire testing requirements must be met: Flame Spread, 25; Smoke Developed, 50.

2.7 Properties of Declared Product as Delivered

When installed according to all applicable Owens Corning specifications, recommendations, and guidelines, QuietR® Duct Board insulation delivers its advertised properties. For additional product property details, visit the specific product pages through www.owenscorning.com.

Table 5. *Product Properties as Delivered*

Type	Thickness	Density, PCF (kg/m3)
Type 475	1" (25 mm)	4.4 (70)
Type 800	1 ½" (38 mm)	3.8 (61)
Type 1400	2" (51 mm)	3.8 (61)

Type designates board stiffness defined by flexural rigidity. Type selection depends on duct size, pressure and reinforcement schedule. The 1 ½" (38mm) and 2" (51mm) thickness provides superior thermal value.

3. LCA: Calculation Rules

3.1 Declared Unit

1m^2 of installed insulation with a building service life of 75 years, including packaging. To allow for better comparability and scaling of product, this study also defined the declared unit to have a thickness that gives an average thermal resistance R_{SI} = 1 m^2·K/W.

Table 6. *Declared unit and reference flows.*

Name	Unit	Value
Declared Unit	m^2	1
Mass (R_{SI} = 1)	kg	2.131
Density	kg/m^3	62.36
Thickness (R_{SI} = 1)	cm	3.417

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3.2 System Boundary

This declaration is a product-specific EPD and represents cradle-to-installation with end-of-life. Details of the system boundaries may be found in the diagrams below. No known flows have been deliberately excluded from this EPD.

Table 7. *System boundary*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	MND

x = Included in system boundary | MND = Module not declared

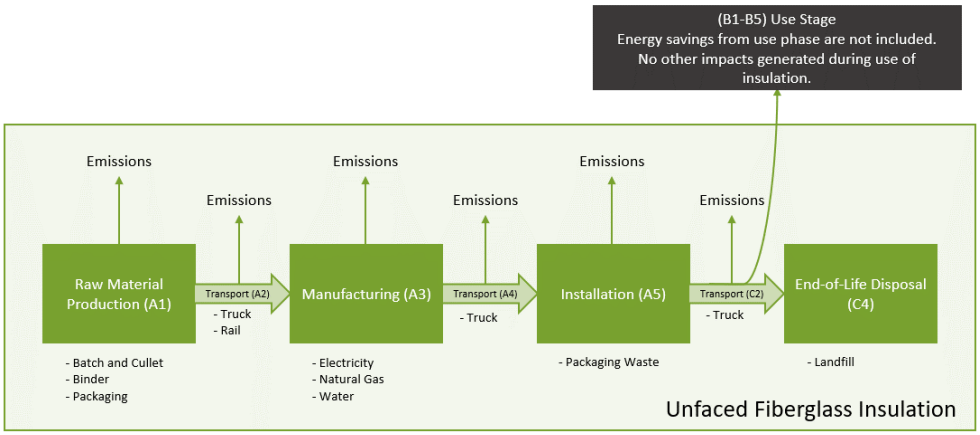


Figure 1. *Flow diagram/System Boundary for unfaced fiberglass insulation.*

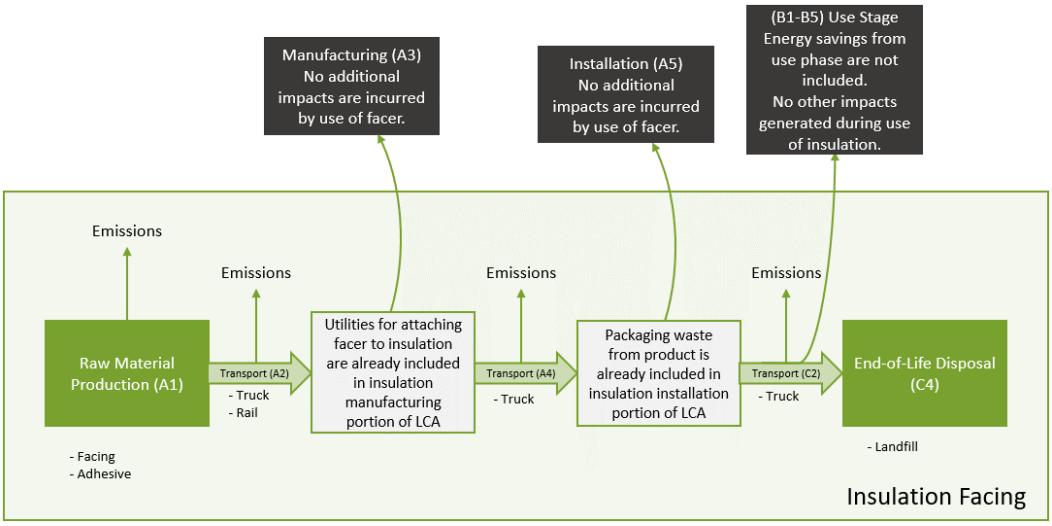


Figure 2. *Flow diagram/System Boundary for insulation facing.*

3.3 Reference Service Life and Estimated Building Service Life

As prescribed in the applicable PCR, the Reference Service Life (RSL) of the insulation product is 75 years, which aligns with an assumed building Estimated Service Life (ESL) of 75 years, for the purposes of this study.

3.4 Allocation

Allocation of primary data was used in this study. In some cases, primary data collected from the manufacturing site were provided on a facility-wide basis and then allocated to the specific insulation product based on production volume (by mass). The types of production activities for the products manufactured at the given manufacturing facility are similar, so mass allocation is considered an acceptable allocation strategy.

3.5 Cut-off criteria

The underlying LCA study is in compliance with the cutoff criteria specified in the PCR. Due to the long lifetime of equipment, capital goods and infrastructure flows were excluded as having a negligible impact on the conclusions of the LCA.

3.6 Data Sources

Primary manufacturing data were collected from the included manufacturing locations listed in the Manufacturing section. Secondary data primarily reference the ecoinvent 3.10.0 database. Table 8 provides LCA modeling data sources. Minor components that have a negligible effect on impact category results are omitted from this table.

Table 8. *Data Sources*

Modules	Flow / Modeled Unit Process	Ecoinvent 3.10.0 Process Dataset(s)	Reference Year
Product Materials			
	Batch Materials		
A1 - - - - - -	Borate	Borax, anhydrous, powder {RoW}| borax production	2023
A1 - - - - - -	Cullet	Glass cullet, sorted {RoW}| treatment of waste glass from unsorted public collection, sorting	2015
A1 - - - - - -	Limestone	Limestone, crushed, washed {RoW}| limestone production	2014
A1 - - - - - -	Manganese dioxide	Manganese dioxide {GLO}| manganese dioxide production	2023
A1 - - - - - -	Sand	Silica sand {RoW}| silica sand production	2023
A1 - - - - - -	Sand Alumina	Silica sand {RoW}| silica sand production	2023
		Aluminium oxide, non-metallurgical {RoW}| market	2019
A1 - - - - - -	Soda Ash	Soda ash, dense {GLO}| soda ash production, dense, Hou's process	2012
	Binder Materials		
A1 - - - - - -	Phenolic resin	Formaldehyde {RoW}| market for formaldehyde	2011
		Phenol {RER}| phenol production, cumene oxidation	2023
		Methanol {RoW}| market for methanol	2018
		Tap water {RoW}| market for tap water	2019
A1 - - - - - -	Urea	Urea {RoW}| urea production	2020
	Packaging Materials		
- - A3 - - - -	Pallet	EUR-flat pallet {RoW}| production	2021
- - A3 - - - -	Cartons/Cardboard	Corrugated board box {RoW}| production	2023
- - A3 - - - -	Bags	Polyethylene, low density, granulate {RoW}| production	2019
		Extrusion, plastic film {RoW}| extrusion, plastic film	2020
- - A3 - - - -	Label, paper	Kraft paper {RoW}| kraft paper production	2023
	Facing Materials		
A1 - - - - - -	Aluminum Foil	Aluminium, primary, ingot {RoW}| market for	2023
		Sheet rolling, aluminium {RoW}| processing	2023
A1 - - - - - -	Barrier Coating, Elastomeric Polymer	Polybutadiene {RoW}| polybutadiene production	2023
A1 - - - - - -	Fiberglass	Glass fibre {RoW}| production	2023
A1 - - - - - -	Adhesive, Emulsion	Polyester resin, unsaturated {RoW}| market for polyester resin	2011
A1 - - - - - -	Natural Kraft	Kraft paper {RoW}| kraft paper production	2023
Electricity/Heat/Resources for Manufacturing			
- - A3 - - - -	Electricity - Waxahachie	Electricity, medium voltage {WAXI-TRE}| market for electricity	2023
- - A3 - - - -	Oxygen	Oxygen, liquid {RoW}| industrial gases production, cryogenic air separation	2023
- - A3 - - - -	Water	Tap water {RoW}| tap water production, conventional treatment	2020
- - A3 - - - -	Natural Gas	Natural gas, high pressure {US}| market for natural gas	2023
- - A3 - - - -	Diesel	Diesel, burned in building machine {GLO}| diesel, burned in building machine	2023
Transportation			
- A2 - - - - -	Rail	Transport, freight train {US}| diesel	2020
- A2 - A3 - A4 - A5 - C2 -	Truck	Transport, freight, lorry >32 metric ton, EURO5 {RoW}| transport, freight	2022

3.7 Data Quality

Primary data were based on measured and calculated data from the Waxahachie, TX Owens Corning plants and reflect calendar year 2023 production. It meets requirements for completeness along with temporal, geographical and

technological representativeness. Background data were taken from the ecoinvent database, which is on the approved database list in the PCR.

Table 9. *Data quality assessment*

Data Quality Parameter	Data Quality Discussion
Time-related Coverage: Age of data and the minimum length of time over which data is collected	Primary data were based on Owens Corning's annual operations during calendar year 2023, consistent with the goal and scope of this analysis. The time coverage of secondary data is provided in the Background Data section.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The geographical coverage for this study is Waxahachie, TX, USA. As such, primary data were sourced directly from this manufacturing location. The geographical coverage of secondary data is provided in the Background Data section.
Technology Coverage: Specific technology or technology mix	Technological representativeness was based on primary manufacturing data from the Owens Corning facilities included in the study.
Precision: Measure of the variability of the data values for each data expressed	Primary data were based on measured and calculated data from the Owens Corning plant which manufactures products covered by this study. The facility data were collected for the reference year 2023, and several sources were used to compare collected values and ensure precision. The data precision is therefore deemed to be of high quality for all measured and calculated data.
Completeness: Percentage of flow that is measured or estimated	Primary data were based on measured and calculated data from the two Owens Corning plants which manufacture products covered by this study. The facility data were collected for the reference year 2023, and several sources were used to compare collected values and ensure precision. The data precision is therefore deemed to be of high quality for all measured and calculated data.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	All relevant process steps within the system boundary were considered. The primary data provided for fiberglass insulation manufacturing were benchmarked with data collected for previous models which have undergone third party review.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	Data sets used in the underlying LCA study were selected based on the most appropriate temporal, geographical, and technological representation of the actual processes and technology. These data sets reflect average processes from multiple sources, and thus generally represent the actual technology utilized to produce the materials. Still, it is often unknown the extent to which secondary data sets deviate from the specific system being studied.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	To ensure consistency, only primary data of the same level of detail and equivalent time interval (i.e., one calendar year) were used, and allocation was conducted similarly for all data categories and life cycle stages. All background data were sourced from the ecoinvent 3.10.0 database selecting the most appropriate geography.
Sources of the Data: Description of all primary and secondary data sources	Primary data for raw material consumption, inbound transportation, annual production, energy consumption, water consumption, emissions to air, waste generation, packaging usage, and distribution of finished goods were used in this study. Secondary data sets were selected from the ecoinvent 3.10.0 database.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	The reproducibility of the study results is merited by the scope information provided in the underlying LCA report. Due to confidentiality of the data values, however, certain details were omitted from this public facing EPD, which may limit reproducibility by the public.

3.8 Period under review

The period of review is calendar year 2023.

3.9 Comparability

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the

practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled. In addition, comparability of EPDs is limited to those applying a functional unit.

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of Mechanical Insulation products using EPD information shall be based on the product's use and impacts at the construction works level, and therefore EPDs may not be used for comparability purposes when not considering the constructions works energy use phase as instructed under this PCR. Full conformance with the PCR for Mechanical Insulation products allows EPD comparability only when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category Part B PCR, and use equivalent scenarios with respect to construction works. However, variation and deviations are possible.

3.10 Estimates and Assumptions

The ability of LCA to consider the entire life cycle of products makes it an attractive tool for the assessment of potential environmental impacts. Nevertheless, similar to other environmental management analysis tools, LCA has several limitations related to data quality and unavailability of potentially relevant data. It should be kept in mind that the impact assessment results are relative expressions and do not predict impacts on category endpoints, exceeding thresholds, or risks.

The study was conducted by including the relevant system boundaries and best available data for QuietR® Duct Board insulation products, using a consistent data collection method and timeframe. In cases where data were reported for the entire facility rather than for the specific insulation materials product, mass allocation was used to allocate the facility-wide impacts to the specific product. This assumes that all products equally consume facility inputs and contribute to facility outputs.

4. LCA: Scenarios and Additional Technical Information

4.1 Manufacture

QuietR® Duct Board insulation consists of two major components, the glass fiber and the binder system. The glass fiber is made from various inorganic materials, which are referred to as batch chemicals. QuietR® utilizes a phenol-urea-formaldehyde (PUF) binder system. The diagram below provides an overview of the manufacturing process.

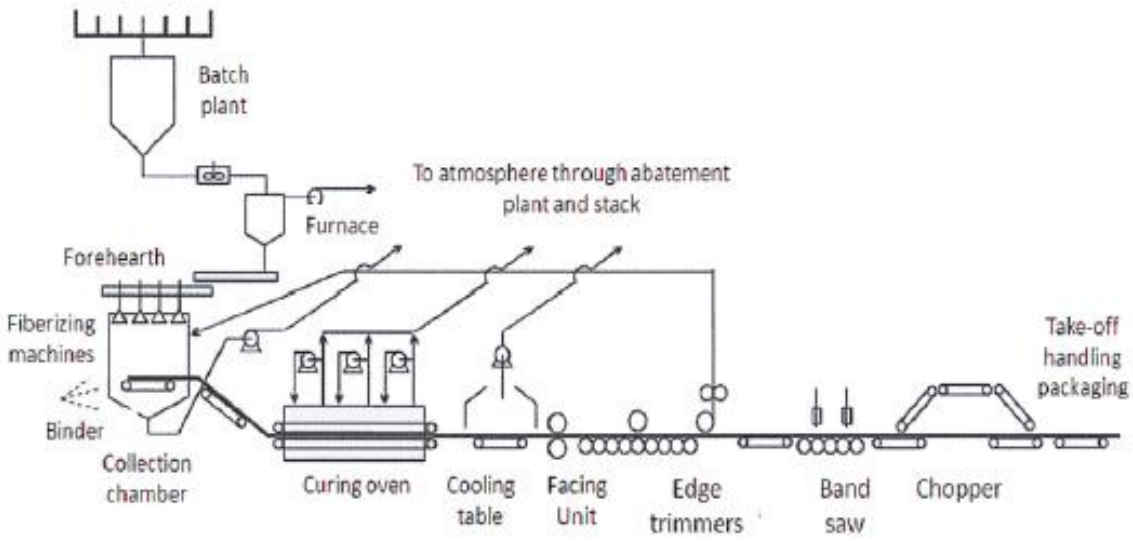


Figure 3. *Manufacturing process diagram.*

4.2 Packaging

QuietR® Duct Board insulation is packaged on pallets and secured and protected using a combination of PET, polyethylene (LDPE), and corrugated materials. End-of-life primary data were unavailable for packaging materials, so this study used the assumptions from UL PCR Part A, Section 2.8.5, Table 3 (Packaging Disposal Assumptions by Region) for the United States.

Table 10. *Packaging type and composition for SoftR® Duct Wrap.*

Packaging Type	Packaging Composition
Cartons	Corrugated
Labels	Paper
Films	Low-Density Polyethylene (LDPE)
Pallets	Wood
Straps	Polyethylene terephthalate (PET)

4.3 Transport to the Building Site (A4)

QuietR® Duct Board insulation is transported away from the manufacturing site by truck. The details for the insulation and facing materials are provided separately in the tables below.

Table 11. *Product distribution parameters, per 1 m^2 QuietR® Duct Board at R_{SI} = 1.*

Name	Unit	Value
Vehicle type	Transport, freight, lorry >32 metric ton, EURO5 {RoW}	
Fuel type	Diesel, low-sulfur	
Liters of fuel	l/100km	9.27E-03
Transport distance	km	6.13E+02
Capacity utilization	%	63%
Gross density of products transported	kg/m^3	6.24E+01
Capacity utilization volume factor	-	1

Table 12. *Product distribution parameters, per 1 m^2 facing material.*

Name	Unit	Foil Reinforced Kraft Facing	Fiberglass Air Stream Mat
Vehicle type		Transport, freight, lorry >32 metric ton, EURO5 {RoW}	
Fuel type		Diesel, low-sulfur	
Liters of fuel	l/100km	4.58E-04	2.77E-04
Transport distance	km	1.15E+03	1.95E+03
Capacity utilization	%	63%	63%
Gross density of products transported	kg/m^3	5.05E+02	1.03E+02
Capacity utilization volume factor	-	1	1

4.4 Installation into the Building (A5)

Fabrication and installation of fiber glass Duct Systems shall be in accordance with the UL listing and shall conform to Owens Corning's published methods and/or latest editions of NAIMA (North American Insulation Manufacturers Association) Fibrous Glass Duct Construction Standards (AH116 or AH 119) or SMACNA (Sheet Metal and Air Conditioning Contractors National Association) Fibrous Glass Duct Construction Standards.

UL 181A Listed Closure must be employed to meet the requirements of UL 181/ULC S110. Use of a Non-Listed closure system voids the UL Class 1 Air Duct Rating. The following are the listed closure methods:

- Pressure-Sensitive Tape (UL 181A-P)
- Mastic and Glass Fabric (UL 181A-M)
- Heat-Activated Tape (UL 181A-H)

For additional technical information, please visit www.owenscorning.com/insulation/commercial/air-distribution.

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Table 13. *Installation summary*

Name	Unit	Value
Ancillary materials (per m^2)	kg	0.00E+00
Water consumption specified by water source and fate	m^3	0.00E+00
Other resources	kg	0.00E+00
Electricity consumption	kwh	0.00E+00
Other energy carriers	MJ	0.00E+00
Product loss per functional unit	kg	0.00E+00
Waste materials at the construction site before waste processing, generated by product installation	kg	3.41E-01
Output materials resulting from on-site waste processing	kg	0.00E+00
Mass of packaging waste specified by type (Plastics / Pulp)	kg	8.28E-04 / 3.40E-01
Recycle (Plastics / Pulp)	kg	*1.24E-04 / 2.55E-01*
Landfill (Plastics / Pulp)	kg	*5.63E-04 / 6.81E-02*
Incineration (Plastics / Pulp)	kg	*1.41E-04 / 1.70E-02*
Biogenic carbon contained in packaging	kg CO_2eq	1.03E-02
Direct emissions to ambient air, soil, and water	kg	0.00E+00
VOC content	µg/m^3	0.00E+00[1]

[1]QuietR® Duct Board holds UL Greenguard Gold Certification

4.5 Use (B1 – B7)

Insulation is a passive device that requires no extra utilities or maintenance to operate over its useful life. Thus, these modules were not included in the system boundary.

4.6 Reference Service Life

Table 14. *Reference Service Life*

Name	Unit	Value
RSL	years	75
Declared product properties (at the gate) and finishes, etc	Will meet declared properties when installed per manufacturer instructions	
Design application parameters (if instructed by the manufacturer), including references to the appropriate practices and application codes	Install per product instructions	
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Will meet R-value and other product specifications when installed per manufacturer instructions	
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	N/A	
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure	Product should be kept dry	
Use conditions, e.g. frequency of use, mechanical exposure		N/A
Maintenance, e.g. required frequency, type and quality of replacement components		N/A

4.7 End-of-Life (C1-C4)

No extra equipment or utilities are needed during deconstruction and demolition to remove insulation. Also, although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life. For these reasons, the C1 and C3 modules were not included in the system boundary.

Table 15. *End-of-Life summary (C2) for 1 m^2 QuietR® Duct Board at R_{SI} = 1.*

End-of-life		Unit	Value
Assumptions for scenario development		Although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.	
Collection process	Collected separately	kg	0.00E+00
	Collected with mixed construction waste	kg	2.13E+00
Recovery	Reuse	kg	N/A
	Recycling	kg	N/A
	Energy recovery	kg	N/A
	Landfill	kg	0.00E+00
Disposal	Product or material for final disposition (landfill)	Kg	0.00E+00
Removals of biogenic carbon (excluding packaging)		kg CO_2	0.00E+00

Table 16. *End-of-Life summary (C2) for 1 m^2 facing materials.*

End-of-life		Unit	Foil Reinforced Kraft	Fiberglass Air Stream Mat
Assumptions for scenario development		Although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.		
Collection process	Collected separately	kg	0.00E+00	0.00E+00
	Collected with mixed construction waste	kg	1.03E-01	6.20E-02
Disposition	Reuse	kg	N/A	N/A
	Recycling	kg	N/A	N/A
	Energy recovery	kg	N/A	N/A
	Landfill	kg	0.00E+00	0.00E+00
Disposal	Product or material for final disposition (landfill)	Kg	0.00E+00	0.00E+00
Removals of biogenic carbon (excluding packaging)		kg CO_2	0.00E+00	0.00E+00

Table 17. *End-of-Life summary (C4) for 1 m^2 QuietR® Duct Board at R_{SI} = 1.*

End-of-life		Unit	Value
Assumptions for scenario development		Although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.	
Collection process	Collected separately	kg	0.00E+00
	Collected with mixed construction waste	kg	0.00E+00
Recovery	Reuse	kg	N/A
	Recycling	kg	N/A
	Energy recovery	kg	N/A
	Landfill	kg	0.00E+00
Disposal	Product or material for final disposition (landfill)	Kg	2.13E+00
Removals of biogenic carbon (excluding packaging)		kg CO_2	0.00E+00

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Table 18. *End-of-Life summary (C4) for 1 m^2 facing materials.*

End-of-life		Unit	Foil Reinforced Kraft	Fiberglass Air Stream Mat
Assumptions for scenario development		Although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.		
Collection process	Collected separately	kg	0.00E+00	0.00E+00
	Collected with mixed construction waste	kg	0.00E+00	0.00E+00
Disposition	Reuse	kg	N/A	N/A
	Recycling	kg	N/A	N/A
	Energy recovery	kg	N/A	N/A
	Landfill	kg	0.00E+00	0.00E+00
Disposal	Product or material for final disposition (landfill)	Kg	1.03E-01	6.20E-02
Removals of biogenic carbon (excluding packaging)		kg CO_2	0.00E+00	0.00E+00

4.8 Re-use Phase

Although reuse and recycling of fiberglass insulation at its end of life is possible, there are no formal programs for collection and transport. It is assumed that all product is sent to landfill at end of life.

Table 19. *Reuse, Recovery and/or Recycling*

Name	Unit	Value
Net energy benefit from energy recovery from waste treatment as declared as exported energy in C3	MJ	N/A
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4	MJ	N/A
Net energy benefit from material flow declared in C3 for energy recovery	MJ	N/A
Process and conversion efficiencies		N/A
Further assumptions for scenario development		N/A

5. LCA: Results

Results of the Life Cycle Assessment are presented below, beginning in Table 22. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. All values in the tables below are rounded to three significant digits. The following impact indicators, specified by the PCR, are reported below:

Table 20. *Life Cycle Impact Assessment Indicators and characterization methods used.*

Abbreviation	Impact Category	Unit	Characterization Method
GWP 100a	Global Warming Potential	kg CO_2 eq	IPCC 2013
ODP	Ozone Depletion Potential	kg CFC11 eq	TRACI 2.1
AP	Acidification Potential	kg SO_2 eq	TRACI 2.1
EP	Eutrophication Potential	kg N eq	TRACI 2.1
SFP	Smog Formation Potential	kg O_3 eq	TRACI 2.1
ADP_{fossil}	Abiotic Resource Depletion Potential of Non-renewable (fossil) energy resources (ADP_{fossil})	MJ, LHV	CML-baseline v4.7

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes.

Table 21. *Additional transparency indicators used.*

Resources	Unit	Waste and Outflows	Unit
RPR_E: Renewable primary energy used as energy carrier (fuel)	[MJ, LHV]	**HWD**: Hazardous waste disposed	[kg]
RPR_M: Renewable primary resources with energy content used as material	[MJ, LHV]	**NHWD**: Non-hazardous waste disposed	[kg]
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	[MJ, LHV]	**HLRW**: High-level radioactive waste, conditioned, to final repository	[kg] or [m^3]
$NRPR_M$: Non-renewable primary resources with energy content used as material	[MJ, LHV]	**ILLRW**: Intermediate- and low-level radioactive waste, conditioned, to final repository	[kg] or [m^3]
SM: Secondary materials	[kg]	**CRU**: Components for re-use	[kg]
RSF: Renewable secondary fuels	[MJ, LHV]	**MR**: Materials for recycling	[kg]
NRSF: Non-renewable secondary fuels	[MJ, LHV]	**MER**: Materials for energy recovery	[kg]
RE: Recovered energy	[MJ, LHV]	**EE**: Recovered energy exported from the product system	MJ, heating value ([Hi] lower heating value) per energy carrier
FW: Use of net fresh water resources	[m^3]		

Table 22. *Carbon Emissions and Removals*

Parameter	Unit
BCRP: Biogenic Carbon Removal from Product	[kg CO2]
BCEP: Biogenic Carbon Emission from Product	[kg CO2]
BCRK: Biogenic Carbon Removal from Packaging	[kg CO2]
BCEK: Biogenic Carbon Emission from Packaging	[kg CO2]
BCEW: Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO2]
CCE: Calcination Carbon Emissions	[kg CO2]
CCR: Carbonation Carbon Removals	[kg CO2]
CWNR: Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	[kg CO2]

Table 23. *Life Cycle Impact Assessment (LCIA) results for 1 m^2 QuietR® Duct Board at R_{SI} = 1*

Impact Category	Units	A1-A3	A4	A5	C2	C4
GWP 100a (2013)	kg CO_2 eq	4.48E+00	1.03E-01	7.84E-02	2.71E-02	5.71E-03
ODP	kg CFC 11 eq	9.49E-08	1.47E-09	8.84E-11	3.85E-10	9.08E-11
AP	kg SO_2 eq	1.16E-02	2.47E-04	2.89E-05	6.48E-05	4.85E-05
EP	kg N eq	1.03E-02	1.68E-05	2.25E-06	4.41E-06	3.07E-06
SFP	kg O_3 eq	1.62E-01	6.28E-03	5.02E-04	1.65E-03	1.52E-03
ADP_{fossil}	MJ, LHV	7.36E+01	1.37E+00	7.60E-02	3.61E-01	7.41E-02

Table 24. *Life Cycle Impact Assessment (LCIA) results for 1 m^2 Foil Reinforced Kraft facing*

Impact Category	Units	A1-A3	A4	A5	C2	C4
GWP 100a (2013)	kg CO_2 eq	5.56E-01	1.80E-02	0.00E+00	2.52E-03	2.75E-04
ODP	kg CFC 11 eq	5.64E-09	2.61E-10	0.00E+00	3.65E-11	4.37E-12
AP	kg SO_2 eq	3.03E-03	9.54E-05	0.00E+00	1.33E-05	2.33E-06
EP	kg N eq	2.98E-04	6.25E-06	0.00E+00	8.74E-07	1.48E-07
SFP	kg O_3 eq	3.89E-02	2.95E-03	0.00E+00	4.12E-04	7.32E-05
ADP_{fossil}	MJ, LHV	6.23E+00	2.45E-01	0.00E+00	3.43E-02	3.56E-03

Table 25. *Life Cycle Impact Assessment (LCIA) results for 1 m^2 Fiberglass Mat for Air Stream Surface*

Impact Category	Units	A1-A3	A4	A5	C2	C4
GWP 100a (2013)	kg CO_2 eq	2.54E-01	9.56E-03	0.00E+00	7.90E-04	3.80E-04
ODP	kg CFC 11 eq	9.37E-07	1.35E-10	0.00E+00	1.12E-11	6.03E-12
AP	kg SO_2 eq	4.70E-04	2.28E-05	0.00E+00	1.89E-06	3.22E-06
EP	kg N eq	1.53E-04	1.55E-06	0.00E+00	1.28E-07	2.04E-07
SFP	kg O_3 eq	9.17E-03	5.81E-04	0.00E+00	4.80E-05	1.01E-04
ADP_{fossil}	MJ, LHV	4.10E+00	1.27E-01	0.00E+00	1.05E-02	4.92E-03

Table 26. *Resource Use Indicator Results for 1 m^2 QuietR® Duct Board at R_{SI} = 1*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
RPR_E	[MJ, LHV]	1.33E+01	2.21E-03	2.99E-04	5.81E-04	3.27E-04
RPR_M	[MJ, LHV]	1.79E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	[MJ, LHV]	7.92E+01	1.38E+00	7.63E-02	3.62E-01	7.44E-02
$NRPR_M$	[MJ, LHV]	1.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	[kg]	3.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	2.95E-02	4.63E-05	3.74E-05	1.22E-05	2.57E-06

Table 27. *Resource Use Indicator Results for 1 m^2 Foil Reinforced Kraft facing*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
RPR_E	[MJ, LHV]	2.10E+00	3.94E-04	0.00E+00	5.51E-05	1.57E-05
RPR_M	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	[MJ, LHV]	6.43E+00	2.46E-01	2.46E-01	3.44E-02	3.58E-03
$NRPR_M$	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	2.34E-03	8.25E-06	0.00E+00	1.15E-06	1.24E-07

Table 28. *Resource Use Indicator Results for 1 m^2 Fiberglass Mat for Air Stream Surface*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
RPR_E	[MJ, LHV]	7.34E-02	2.04E-04	0.00E+00	1.69E-05	2.17E-05
RPR_M	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	[MJ, LHV]	9.62E+00	1.27E-01	0.00E+00	1.05E-02	4.94E-03
$NRPR_M$	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	1.36E-03	4.28E-06	0.00E+00	3.54E-07	1.71E-07

Table 29. *Waste and Output Flow Indicator Results for 1 m^2 QuietR® Duct Board at R_{SI} = 1*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
HWD	[kg]	2.03E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	[kg]	2.65E-01	0.00E+00	6.86E-02	0.00E+00	2.13E+00
HLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	[kg]	3.07E-02	0.00E+00	2.55E-01	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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Table 30. *Waste and Output Flow Indicator Results for 1 m^2 Foil Reinforced Kraft facing*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
HWD	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 31. *Waste and Output Flow Indicator Results for 1 m^2 Fiberglass Mat for Air Stream Surface*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
HWD	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 32. *Carbon Emissions and Removals Indicator Results for 1 m^2 QuietR® Duct Board at R_{SI} = 1*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
BCRP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	[kg CO_2]	1.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 33. *Carbon Emissions and Removals Indicator Results for 1 m^2 Foil Reinforced Kraft facing*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
BCRP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 34. *Carbon Emissions and Removals Indicator Results for 1 m^2 Fiberglass Mat for Air Stream Surface*

Resource Use	Unit	A1 – A3	A4	A5	C2	C4
BCRP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	[kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Calculating Environmental Impact Values for Products with Specific Properties

Results presented above are representative of an average product corresponding to the functional unit of RSI = 1 m^2K/W, expressed in metric units. That is equivalent to R = 5.68 in US Customary Units. The following scaling factors have been provided to assist in understanding the impacts for the specific, individual products that are commercially available.

Table 35. *Scaling Factors for QuietR® Duct Board*

QuietR® Duct Board		Thickness, in (mm)		
		1.0 (25)	1.5 (38)	2 (51)
Density, lb/ft3 (kg/m3)	3.8 (61)	--	1.09	1.45
	4.4 (70)	0.84	--	--

Below is an example demonstrating how to use the product scaling factors in combination with the impact values. The example calculation uses the A1-A3 GWP 100a impact value for 1 m^2 QuietR® Duct Board Insulation (4.48E+00 kg CO_2eq) and the scaling factor for a product that has a density of 4.4 lb/ft^3 and a thickness of 1.0 in (scaling factor = 0.84), and then adds the A1-A3 GWP 100a impact value for 1 m^2 Foil Reinforced Kraft (FRK) facing (5.56E-01 kg CO_2eq) and 1 m^2 Fiberglass Mat for Air Stream Surface (2.54E-01 kg CO_2eq).

Table 36. *A1-A3 GWP 100a (2013) Results for 1 m^2 QuietR® Duct Board Insulation, 1 m^2 Foil Reinforced Kraft Facing, and 1 m^2 Fiberglass Mat for Air Stream Surface*

		1 m^2 QuietR® Duct Board	*1 m^2 Foil Reinforced Kraft Facing*	*1 m^2 Fiberglass Mat for Air Stream Surface*
Impact Category	Units	A1-A3	A1-A3	A1-A3
GWP 100a (2013)	kg CO_2 eq	4.48E+00	5.56E-01	2.54E-01

Sample Calculation:

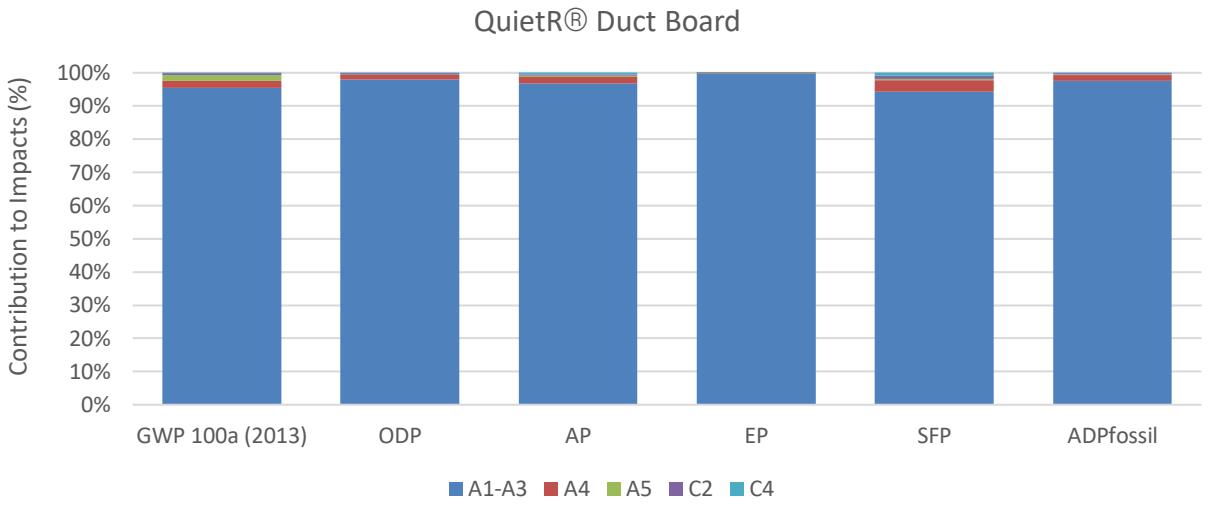
4.57E+00 kg CO_2eq = 4.48E+00 kg CO_2eq X 0.84 + 5.56E-01 kg CO_2eq + 2.54E-01 kg CO_2eq

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6. LCA: Interpretation

6.1 Interpretation

The Product Stage (A1-A3) is clearly the primary contributor to all impact categories. Within A1-A3, A3 manufacturing, which includes electricity during production and air emissions from production activities, is the largest contributor.



The primary data used for this study represent production of QuietR® Duct Board insulation at a single manufacturing site in Waxahachie, TX, USA from January 2023 through December 2023 using consistent methods and materials.

6.2 Assumptions and Limitations

The ability of LCA to consider the entire life cycle of products makes it an attractive tool for the assessment of potential environmental impacts. Nevertheless, similar to other environmental management analysis tools, LCA has several limitations related to data quality and unavailability of potentially relevant data. It should be kept in mind that the impact assessment results are relative expressions and do not predict impacts on category endpoints, exceeding thresholds, or risks.

The study was conducted by including the relevant system boundaries and best available data for QuietR® Duct Board products, using a consistent data collection method and timeframe. In cases where data were reported for the entire facility rather than for the specific insulation materials product, mass allocation was used to allocate the facility-wide impacts to the specific product. This assumes that all products equally consume facility inputs and contribute to facility outputs.

7. Additional Environmental Information

7.1 Environment and Health during Manufacture

Depending on the plant facility, the following environmental equipment may be used to control emissions: electrostatic precipitator, scrubber, and/or fabric filter (baghouse).

7.2 Energy Savings During Use

Insulation is a passive device that requires no extra utilities to operate over its useful life. Insulation of a building and its components may be responsible for reducing the energy burden associated with heating and cooling of the building.

7.3 Environment and Health during Installation

This product is considered an article. The 29 CFR 1910.1200(c) definition of an article is as follows: "Article" means a manufactured item other than a fluid or particle, (i) which is formed to a specific shape or design during manufacture, (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use, and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Manufactured articles which meet the definition of the Canadian Hazardous Products Act (any article that is formed to a specific shape or design during manufacture, the intended use of which when in that form is dependent in whole or in part on its shape or design, and that, when being installed, if the intended use of the article requires it to be installed, and under normal conditions of use, will not release or otherwise cause an individual to be exposed to a hazardous product) are not regulated by the Canadian Hazardous Products Regulation SOR/2015-17.

The product's Safe Use Instruction Sheet includes exposure guidelines, engineering controls, and individual protection measures. The following individual protection measures can be considered:

- Eye/face protection – Wear safety glasses with side shields (or goggles)
- Skin and body protection – Wear protective gloves, long-sleeved shirt and long pants
- Respiratory protection – When facing airborne/dust concentration above the exposure limits, use an appropriate certified respirator. A properly fitted NIOSH approved disposable N95 type dust respirator or better is recommended.
- General hygiene instructions – Wash hands before breaks and immediately after handling products. Remove and wash contaminated clothing before re-use.

No extraordinary effects or environmental impacts are expected due to destruction of the product by fire, water, or mechanical means.

7.5 Delayed Emissions

No delayed emissions are expected from this product.

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7.6 Environmental Activities and Certifications

QuietR® Duct Board products have the following certification and sustainable features:

- Certified by SCS Global Services to contain recycled content. Consult the SCS Global Services Green Products Guide for detailed recycled content information.
- GREENGUARD Gold: Certified products are certified to GREENGUARD standards for low chemical emissions into indoor air during product usage (GREENGUARD Gold certification is for boards 1" or less in thickness".
- HPD



Made with Renewable Electricity and Reduced Carbon Footprint

QuietR® Duct Board is available upon request with SCS Global Services certification for "Made with Renewable Electricity" and "Reduced Carbon Footprint". The updated environmental impacts for the products by matching the amount of electricity used in manufacturing with wind energy produced as part of Owens Corning's Power Purchase Agreement were calculated and can be found in the table below. The values for life cycle stages A1-A3 below reflect calculations based on the 2023 plant dataset and the electricity impacts per the SimaPro implementation of the ecoinvent versions of the NERC power grids. Certificates published on the SCS Global Services website are based on calculations using updated NERC and eGrid power grid data and updated manufacturing production data per the certification guideline, so variation between the values is expected.

Table 37. *Changes in Environmental Impact Category Results (A1-A3) Due to the use of Renewable Energy*

Impact Category	Units	2023 Dataset – Grid Electricity	2023 Dataset – REC Electricity	Change with REC	% Change
GWP 100a (2013)	kg CO_2 eq	4.48E+00	3.00E+00	-1.48E+00	-33.0%
ODP	kg CFC 11 eq	9.49E-08	7.18E-08	-2.31E-08	-24.3%
AP	kg SO_2 eq	1.16E-02	8.52E-03	-3.07E-03	-26.5%
EP	kg N eq	1.03E-02	9.85E-03	-4.89E-04	-4.7%
SFP	kg O_3 eq	1.62E-01	1.31E-01	-3.11E-02	-19.2%
ADP_{fossil}	MJ, LHV	7.36E+01	5.27E+01	-2.09E+01	-28.4%

7.7 Further Information

Further information on the product can be found on the manufacturers' website at www.owenscorning.com.

8. References

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- PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 4.0. UL Environment. Mar. 2022.
- PCR Guidance for Building-Related Products and Services Part B: Mechanical, Specialty, Thermal, and Acoustic Insulation Product EPD Requirements. Version 1.0. Sept. 2019.
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- ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- ASTM C1104, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation
- ASTM C1338, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- ASTM G21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- ASTM G22, Standard Practice for Determining Resistance of Plastics to Bacteria
- ICC International Mechanical Code
- NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems
- NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems
- UL 181, Factory-Made Air Ducts and Air Connectors
- UL 723, Test for Surface Burning Characteristics of Building Materials
- ULC S102, Surface Burning Characteristics of Building Materials and Assemblies
- ULC S110, Standard Methods of Tests for Air Ducts
- SCS Global Services Guideline for Claims of "Made with Renewable Energy" or "Reduced Carbon Footprint" Based on Power Purchase Agreement, February 2018

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