Mineral Wool Insulation Panels

PowerWool Insulation

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and ISO 21930:2017

PowerWool Insulation is pleased to present this Environmental Product Declaration (EPD) for their Mineral Wool Insulation Panels (RigiBoard ONE, RigiBoard Pro Max, CavityBoard, CurtainBoard 80, Industrek 1245, and RigiBoard 80). This EPD was developed in compliance with ISO 14025, ISO 21930 and PCR Part B and has been verified by Lindita Bushi, Ph.D. from Athena Sustainable Materials Institute.

The LCA and the EPD were prepared by Vertima Inc. The EPD includes cradle-to-grave life cycle assessment (LCA) results.

For more information about PowerWool Insulation, visit https://powerwoolinsulation.com.

For any explanatory material regarding this EPD, please contact the program operator.

1. GENERAL INFORMATION

PCR GENERAL INFORMATION			
Reference PCR	Product Category Rule (PCR) Guidance for Building-Related Products and Services from UL Solutions in Part B: Building Envelope Thermal Insulation EPD Requirements. Edition 4.0, published on November 3, 2025. ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20		
The PCR review was conducted by:	*Dr. Thomas P. Gloria, Ph.D Industrial Ecology Consultants t.gloria@industrial-ecology.com*	*Cara Vought Sustainable Solutions cara@sustainablesolutions.com*	*Andre Desjarlais Oak Ridge National Laboratory desjarlaisa@ornl.gov*

EPD GENERAL INFORMATION		
Program Operator	ASTM 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, USA https://www.astm.org/	
Declared Product	**Mineral Wool Insulation Panels**	
EPD Registration Number # 1129	**EPD Date of Issue** March 2026	**EPD Period of Validity** March 2026 - March 2031
EPD Recipient Organization	PowerWool Insulation #107 - 3757 190th Street Surrey, British Columbia, V3Z 0P6 Canada https://powerwoolinsulation.com/	

EPD scope: Cradle-to-Grave **EPD Type:** Product-specific EPD **Functional Unit:** 1 m^2 of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m^2K/W, and with a building service life of 75 years.			**Year of Reported Manufacturer Primary Data** 2023-2024
Geographical Scope North America	**LCA So tware** OpenLCA v.2.5	**LCI Databases** Ecoinvent 3.9.1 and US LCI	**LCIA Methodology** IPCC 2013 and Traci v 2.1

This LCA and EPD were prepared by:	Vertima Inc. www.vertima.ca
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2006 and ISO 14044:2006, as well as the PCR from UL Solutions Part B: Building Envelope Thermal Insulation EPD Requirements, which is based on ISO 21930:2017. ☐ Internal ☒ External	*Lindita Bushi* Lindita Bushi, Ph.D. Athena Sustainable Materials Institute

The owner of the declaration shall be liable for the information and evidence herein; ASTM, or its affiliates, shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence.

LIMITATIONS

Environmental declarations from different programs (ISO 14025) may not be comparable.

Comparison of the environmental performance of Building Envelope Thermal Insulation using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Caution must be used when comparing EPDs, as variations and deviations are possible (e.g. Different LCA software and background LCI datasets that may lead to differences in calculated and reported results) [1].

2. PRODUCT SYSTEM DESCRIPTION

2.1. PRODUCT DESCRIPTION

PowerWool insulation panels is a family of non-structural, rigid and semi-rigid mineral wool insulation panels designed for use as continuous exterior insulation. The products under study are covered by a Part B subcategory. These products are engineered to increase the effective thermal value of walls and eliminate thermal bridging. Available in various densities and sizes, PowerWool™ panels suit a wide range of applications including exterior wall insulation, cavity wall insulation, rainscreen systems, and curtain walls.

The insulation panels are fully non-combustible, with a Flame Spread Index (FSI) of 0 and a Smoke Developed Index (SDI) of 0, making them ideal for high-fire-resistance applications. They are approved for use in both Canada and the United States. PowerWool panels are unfaced panels.

Thanks to their mineral wool composition, PowerWool™ panels provide exceptional thermal resistance, with an R-value of R-4 per inch, helping to meet North American energy code requirements. Their highly vapor-permeable structure, more so than most weather barriers, allows moisture to safely escape from walls, ensuring greater building durability. Additionally, these products are highly resistant to water absorption and do not promote the growth of fungi. The product line includes options specifically designed for higher compressive strength, making them a robust choice for heavy facade claddings.

These insulation panels correspond to CSI MasterFormat code 07 21 13.19 - Mineral Board Insulation. A detailed description can be found on PowerWool's website (PowerWool Rigid Mineral Wool Insulation | Exceptional Fire-Resistance & Vapour Permeability).

Figure 1 provides illustrations of an insulation panel.

Figure 1: Representations of a mineral wool insulation panel [Photo courtesy of PowerWool Insulation].

2.1.1 Product application

PowerWool insulation panels (RigiBoard One, RigiBoard Pro Max, CavityBoard, CurtainBoard 80, Industrek 1245 and RigiBoard 80 (EPD)) are non-structural, rigid mineral wool products designed to enhance the thermal performance, fire resistance, and moisture management of exterior wall systems. With industry-leading compression strength, high R-value per inch, and exceptional vapor permeability, these panels are suitable for demanding cladding and rainscreen assemblies, offering durability, safety, and reliable performance for various commercial and residential applications.

2.1.2 Technical requirements

PowerWool has several panel variants with different thicknesses. For this study, a reference thickness of 2 inches has been established. The environmental impacts of panels with other thicknesses are estimated by applying a scaling factor relative to the reference panel's thickness.

In this Environmental Product Declaration (EPD) report, two reference panels are defined for extrapolation:

1- **CavityBoard**, representing the group composed of CavityBoard, CurtainBoard 80, Industrek 1245 and RigiBoard 80 (EPD).

2- **RigiBoard One**, representing the group composed of RigiBoard One and RigiBoard Pro Max.

Panels within each group are manufactured at the same plant; results are linear only within the same facility. **Scaling factors** are therefore applied to extrapolate the environmental impacts of other panels from their respective reference panel. Scale factors are determined by the mass (kg) and functional unit (FU). Environmental Impact per m2 of product X = Environmental Impact of reference product multiplied by scaling factor. Please note that the scaling factors give the precise amount of material needed to produce the other product types. The scaling factors used for each panel and thickness are provided in Table 1.

For detailed product properties and performance data on PowerWool Insulation panels, please refer to the following link: PowerWool Rigid Mineral Wool Insulation | Exceptional Fire-Resistance & Vapour Permeability.

Table 1: Scaling factor for extrapolating environmental impacts from reference panel and thickness

Panels	Scaling factor
CavityBoard	**1.00**
CurtainBoard 80	1.39
Industrek 1245	1.00
RigiBoard 80 (EPD)	1.78
Second group of panels	
RigiBoard One	**1.00**
RigiBoard Pro Max	1.26

Thickness (inch)	Scaling factor
1.00	0.50
1.50	0.75
2.00	**1.00**
2.50	1.25
3.00	1.50
3.50	1.75
4.00	2.00
4.50	2.25
5.00	2.50
5.50	2.75
6.00	3.00

2.1.3 Applicable Product Standards

PowerWool's insulation panels respect the following standards per product type:

- CAN/ULC S702.1 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- ASTM C518-17 - Thermal resistance
- ASTM C165-07 - Compressive resistance

- ASTM E84 (UL 723, NFPA 255) and CAN/ULC S102, CAN/ULC S114, ASTM E136 - Surface burning characteristics and non-combustibility
- ASTM E96M-16 - Water vapor transmission
- ASTM C1104-13A, ASTM C1338-08 - Moisture absorption and fungal resistance
- ASTM C303, ASTM C356 - Actual density and dimensional stability.

2.1.3 Properties of declared product as delivered

PowerWool panels are rigid mineral wool insulation designed to provide high thermal performance and excellent mechanical strength. They feature optimized density for reliable dimensional stability and are suitable for various building applications. These panels comply with stringent North American standards for thermal resistance (ASTM C518), dimensional stability (ASTM C356), compressive strength (ASTM C165), and fire performance including non-combustibility and surface burning characteristics (ASTM E84, ASTM E136). Their water vapor transmission (ASTM E96) and resistance to moisture and fungal growth (ASTM C1104, ASTM C1338) ensure durability and comfort within the building envelope.

For detailed information about the properties of the insulation panels, please refer to PowerWool Insulation's website: PowerWool Rigid Mineral Wool Insulation | Exceptional Fire-Resistance & Vapour Permeability.

2.2. MATERIAL COMPOSITION

The raw materials input for the two reference panels, CavityBoard and RigiBoard One, are detailed in Table 2 below.

Table 2: Material composition for the two reference mineral insulation panels.

Materials/components	CavityBoard 2”		RigiBoard One 2”	
	Kg per m^2	%	Kg per m^2	%
Basalt	3.07E+00	62.14%	6.29E+00	61.91%
Dolomite	6.69E-01	13.53%	1.34E+00	13.21%
Mineral Slag	6.10E-01	12.35%	1.23E+00	12.06%
Coke	9.20E-02	1.86%	1.85E-01	1.82%
Resin	4.94E-01	10.00%	1.10E+00	10.87%
Anti-dust oil	5.82E-03	0.12%	1.30E-02	0.13%
Total	4.94E+00	100%	1.02E+01	100%

2.3. MANUFACTURING

PowerWool panels are manufactured at two industrial facilities located in Jiangsu Province, China. The production process involves the high-temperature melting and spinning of mineral raw materials (primarily basalt, dolomite, slag, resin, and anti-dust oil) into mineral wool fibers. These fibers are treated with binders and anti-dust agents, then formed into rigid or semi-rigid panels with a specified density and thickness through curing and cutting operations. The panels are finally labeled and packaged.

Manufacturing operations rely on external energy and water inputs and generate process emissions and residual materials. Quality assurance measures are implemented throughout the process to ensure conformity with technical specifications. Waste generated during manufacturing is managed in accordance with applicable environmental regulations and internal procedures. Packaging is optimized to maintain product integrity during storage and transport.

2.4. ENVIRONMENT AND HEALTH DURING MANUFACTURING

PowerWool Insulation complies with applicable provincial and federal health, safety, and environmental regulations. At their manufacturing facilities, recyclable production scraps such as mineral wool offcuts and packaging materials are separated for recycling whenever possible. Waste management practices follow approved protocols.

2.5. PACKAGING

Packaging for PowerWool's insulation panels primarily consists of low-density polyethylene (LDPE) shrink film. Packaging data were modeled using representative datasets from the ecoinvent v3.9.1 database, consistent with international LCA data quality requirements. Global Warming Potential (GWP) results based on biogenic Carbon content of packaging = 0 kg CO2eq.

2.6. PRODUCT INSTALLATION

PowerWool Insulation Inc. recommends that its insulation panels be processed and installed in accordance with industry best practices and all applicable building codes in Canada and the United States, where the panels are commonly sold.

This module accounts for material losses and packaging waste generated on-site during the manual installation of insulation panels. With the lack of specific data from the manufacturer and to be conservative, the amount per FU of ancillary materials, electricity consumption, and diesel fuel for onboard generators were sourced from Table 4C of the PCR part B (See Table 3 below). Plastic packaging waste generated at the installation site is modeled with a recycling rate of 78% and a landfilling rate of 22%, in accordance with *UL Solutions PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements for Building-Related Products and Services* [2]. Transport from installation sites to waste treatment facilities is included in the modeling. As mentioned in the PCR Part B, loss represents 2% of the FU. These mean that the burden of production (A1, A2 and A3) and transportation (A4) of the loss (2%) is accounted in this module.

Table 3: Installation parameters for FU

Name	Amount	Unit
Fasteners	0.0012	kg
Adhesive	0.0012	kg
Electricity consumption	0.012	kWh
Diesel fuel for onboard generators	0.37	MJ
Product Loss	2	%

2.7. TRANSPORTATION

This module accounts for the transportation of insulation panels from the manufacturing facilities in Nanjing and Quxia Taixing to the final installation sites in North America, following a multi-module logistics chain. The transport route includes:
(i) Road transport from the Nanjing and Quxia Taixing factories to their respective local ports (Port of Nanjing or Port of Quxia Taixing);
(ii) Inland waterway or short-sea shipping to the Port of Shanghai;
(iii) Ocean freight from the Port of Shanghai to the Port of Vancouver (BC, Canada);
(iv) Road transport from the Port of Vancouver to the PowerWool warehouse located at #107 - 3757 190th Street, Surrey, BC.

From the Surrey warehouse, panels are distributed by truck to installation sites across North America, with an allocation of 93.9% to sites in Canada and 6.1% to sites in the USA. A weighted average transport distance was calculated based on sales distribution. Table 4 below shows the distribution parameters of module A4.

Table 4: **Distribution parameters by product and transport mode per FU**

Parameter	Unit	Value	
Ground transport			
Fuel Type	-	Diesel	
Amount of fuel	L/100km	18.7	
Vehicle type	-	Disel truck	
Capacity utilization	%	75	
Ocean transport			
Fuel Type	-	Fuel oil	
Amount of fuel	g/tkm	2.52	
Vehicle type	-	Ocean freighter	
Capacity utilization	%	70	
Products	Amount (kg)	Transport distance (km)	
		Road	Ship
RigiBoard One	10.16	2 100.31	10 278.00
CavityBoard	4.94	2 100.31	10 350.00

2.8. USE CONDITIONS

PowerWool mineral wool insulation panels are non-combustible, moisture-resistant, and dimensionally stable. They do not require any special maintenance during the use phase. However, to preserve their thermal and acoustic performance over time, it is recommended to protect the panels from prolonged exposure to bulk water or physical damage in applications where they are not enclosed within a building envelope. When used as intended, the panels remain durable and effective without the need for cleaning or routine inspection.

2.9. PRODUCT REFERENCE SERVICE LIFE AND BUILDING ESTIMATED SERVICE LIFE

As the insulation panels are neither replaced, repaired, nor maintained during use and are dismantled with the building, their reference service life (RSL) is assumed to match the building's estimated service life (ESL), set at 75 years in the PCR [2], [3].

2.10. RE-USE PHASE

PowerWool panels may be suitable for reuse if they remain in good condition and retain their original thermal, mechanical, and fire performance properties. Their dimensional stability ensures compatibility with new building applications, provided the panels meet the specific project requirements and have not sustained damage during previous use.

2.11. DISPOSAL

At the end of their service life, the insulation panels are dismantled and disposed of in sanitary landfills, in accordance with typical practices for managing mineral-based construction waste in Canada.

Non-recyclable residues or panels that have been damaged or contaminated during use are usually disposed of through conventional waste management routes, such as landfill. PowerWool's approach to material selection and production supports alignment with industry practices that promote responsible end-of-life management, with an emphasis on material recovery wherever feasible. See Table 5 below.

Table 5: End of life data

Name	Items	Value		Unit
Product names		RigiBoard One	CavityBoard	
Deconstruction (module C1)		-	-	kWh
Transport (module C2)		50		km
Collection process	Collected with mixed construction waste	1.02E+01	4.94E+00	kg
Waste processing (module C3)	Reuse	-	-	kg
	Recycling	-	-	kg
	Incineration without energy recovery	-	-	kg
	Incineration with energy recovery	-	-	kg
	Energy conversion efficiency rate	-	-	kg
Disposal (module C4)	Product or material for final deposition (landfill)	1.02E+01	4.94E+00	kg

3. LCA CALCULATION RULES

3.1. FUNCTIONAL UNIT

Consistent with the PCR, the selected functional unit (FU) for this study is 1 m^2 of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m^2K/W, and with a building service life of 75 years. See Table 6 below.

Table 6: Functional unit of the insulation panels, including mass per m^2, conversion factor to 1 kg and average thicknesses.

Item	Unit	CavityBoard	RigiBoard One
Functional unit	m^2	1	1
Mass	kg	4.94	10.16
Conversion factor	m^2/kg	0.20	0.10
Average thickness	m	0.07	0.07
Density	kg/m^3	72	140

3.2. PRODUCTION AVERAGE

PowerWool Insulation operates two manufacturing facilities located in Jiangsu Province, China. The two facilities were considered separately, as production data from each site was used to model the manufacturing conditions. The production data covers two reference years:

- 2023 - for RigiBoard One and RigiBoard Pro Max, manufactured in one facility;
- 2024 - for CavityBoard, CurtainBoard 80, Industrek 1245 and RigiBoard 80 (EPD) manufactured in the second facility.

The results presented are not the average of the two facilities.

3.3. SYSTEM BOUNDARIES

The system boundaries are **cradle-to-grave**, covering the entire life cycle stage as illustrated in Table 7. All life cycle modules are considered, namely: A1) Extraction and Upstream Production, A2) Transport to Factory, A3) Manufacturing, A4) Transport to Construction Site, A5) Installation, B1-B7), Use C1) Deconstruction, C2) Transport to Waste Processing, C3) Waste Processing, and C4) Disposal of Waste. Figure 2 presents the process flow diagram.

Table 7: Description of the system boundary life cycle stages and related information modules

PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Extraction and Upstream Production	Transport to Factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Waste Processing or Disposal	Waste Processing	Disposal of Waste
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Key: X = included

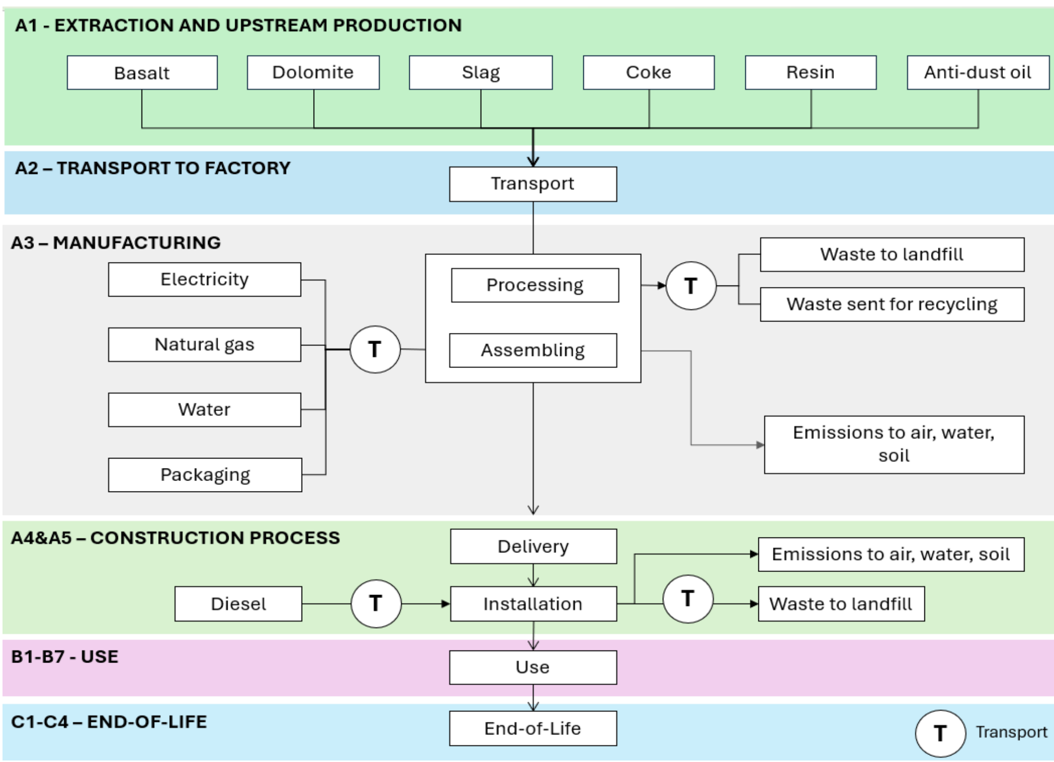

Figure 2: Flow diagram of the main production processes for insulation panels ("T" = transport).

Production (modules A1 to A3)

Extraction and upstream production (module A1): This stage covers the extraction and upstream production of raw materials used in the manufacture of mineral wool insulation panels. Basalt is the primary raw material, complemented by dolomite, ground granulated blast furnace slag, phenolic resin, and minor additives such as lubricating oil. Background data were sourced from the ecoinvent v3.9.1 database and regionally adapted to reflect production conditions representative of the East China power grid mix. No green power or CO_2 certificates are used in the study.

Transport to factory (module A2): This stage includes the transportation of raw materials from various suppliers to the two manufacturing facilities located in Jiangsu Province, China. Transport distances and modes are representative of typical supply chains for mineral insulation products in the region. The modeling relies on background datasets from ecoinvent v3.9.1.

Manufacturing (module A3): This stage encompasses the consumption of municipal electricity, natural gas, and coke used during the melting process. Municipal water supply consumption and packaging materials, such as shrink film for preparing finished products for shipment, are also included.

Construction (modules A4 to A5)

Transport to site (module A4): This stage covers the distribution of finished panels from the manufacturing facilities to construction sites in North America. It includes all transportation steps along the logistics chain, including inland, oceanic, and overland freight. The modeling relies on background datasets from ecoinvent v3.9.1 and US LCI database.

Installation (module A5): This module accounts for material losses and packaging waste generated on-site during the manual installation of insulation panels. With the lack of specific data from the manufacturer and to be conservative, the amount per FU of ancillary materials, electricity consumption, and diesel fuel for onboard generators were sourced from Table 4C of the PCR Part B. As mentioned in the PCR Part B, loss represents 2% of the FU. These mean that the burden of production (A1, A2 and A3) and transportation (A4) of the loss (2%) are accounted in this module.

Use (modules B1 to B7)

As the insulation panels do not require operational energy, maintenance, repair, replacement, refurbishment, or any other interventions during their service life, their environmental impact during the use phase is assumed to be zero.

End-of-Life (modules C1 to C4)

De-construction/Demolition (module C1): Deconstruction activities are assumed to be performed manually, with no significant energy or material inputs; therefore, no environmental impacts are attributed to this module.

Transport to waste processing or disposal (module C2): This stage includes the transportation of end-of-life insulation materials to relevant waste treatment or disposal facilities. Transport distances and modes are based on standard regional assumptions and modeled using average values from ecoinvent v3.9.1.

Waste processing (module C3): This module involves no energy consumption, as all waste generated in C1 is directly sent to the landfill sites. This assumption aligns with Canadian practices, where mineral construction waste is typically landfilled.

Disposal of waste (module C4): This module covers the landfilling of 100% of the insulation panels. This scenario reflects typical practices in Canada, where mineral-based insulation waste is generally landfilled.

3.4. CUT-OFF CRITERIA

According to ISO 21930 [4], if a mass flow or energy flow represents less than 1% of the cumulative mass or energy flow of the system, it may be excluded from system boundaries. However, these flows should not have a relevant environmental impact. Also, at least 95% of the energy usage and mass flow shall be included.

In this study, no primary data (input material, energy consumption) was excluded from the system boundaries.

Excluded from the model are data related to the construction, maintenance, and dismantling of capital assets, daily employee commuting, office work, business travel, and other activities associated with PowerWool Insulation's staff. The model only considers infrastructure processes already included within the ecoinvent unit processes.

3.5. ALLOCATION

The ISO 14040 allocation procedure states that whenever possible, allocation should be avoided by collecting data related to the process under study or by expanding the product system [5].

According to ISO 14040, step 2 consists of partitioning the inputs and outputs between the different products in a way that reflects the physical relationship between them.

Allocation was performed based on mass approach for each input (primary and secondary materials, energies, water, packaging and waste) for each product under study. Data relative to energy consumption (electricity, natural gas, coke) was provided for each plant for the reference year by the manufacturer. No blowing agent is used in this project. No burdens are allocated across the system boundary with secondary material, secondary fuel or recovered energy flows arising from waste. Processing of secondary materials used as input for manufacturing the product are included in the analysis but processes that are part of waste processing in the previous product system are excluded.

3.6. DATA SOURCES AND QUALITY REQUIREMENTS

Data Quality Parameter	Data Quality Discussion
Source of manufacturing data: Description sources of data	Primary manufacturing data was collected from PowerWool's manufacturing plants located in Jiangsu (China), covering the 2023 and 2024 production years. This data included: total annual mass of products produced at the manufacturing plant; specific product composition; raw materials and fuels entering the product production process; transport distance of materials and fuels; electricity consumption; water consumption; waste treatment; and packaging for each manufacturing facility.
Source of secondary data: Description sources of raw materials, fuels and electricity data	Background data was taken from ecoinvent 3.9.1 "cut-off" datasets representative of China, Canada, the United States or North America. When appropriate, the grid mix was changed for the grid mix of the province or country where production takes place. Otherwise, ecoinvent data representative of the global market or the "rest-of-the-world" was selected as proxies. Wood and transport data were taken from the US LCI Database [6], which is specific to a North American context. No green power and CO_2 certificates are used in the study.
Geographical representativeness	PowerWool Insulation's manufacturing facilities are located in Jiangsu, China. Accordingly, electricity consumption is modeled using the East China (CN-ECGC) regional grid mix, and natural gas consumption is based on supply data for Jiangsu Province (CN-JS). Geographical correlation of the material supply and the selected datasets are largely representative of the same area. When this was not possible, datasets representing a larger geographical area were used.
Temporal representativeness	Primary data were collected to be representative of the 2023 and 2024 production years. Datasets selected from ecoinvent and US LCI were not always published within the last ten years. Nevertheless, ecoinvent and US LCI remain the primary reference LCI databases.
Technological representativeness	Primary data, obtained from the manufacturer, is representative of the current technologies and materials used by this company.
Completeness	All relevant process steps were considered and modelled to satisfy the goal and scope. No known flows were cut off.

4. LIFE CYCLE ASSESSMENT RESULTS

4.1. RESULTS TABLES

Results are presented per FU of insulation panel. It should be noted that Life Cycle Impact Assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. These six 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. The results are presented for two products: CavityBoard 2” and RigiBoard 2”. To obtain other results, factors will be applied. It should be noted that the products and packaging materials do not contain biogenic carbon.

However, the EPD users shall not use additional measures for comparative purposes.

Environmental Indicator	
IPCC-2013 and Traci v 2.1	
LCIA indicators	Acidification potential
	Eutrophication potential
	Global warming potential
	Ozone layer depletion potential
	Photochemical ozone formation
	Abiotic resource depletion potential (ADP): fossil fuels
Resource use	
RPR_E	Renewable primary resources used as an energy carrier (fuel)
RPR_M	Renewable primary resources with energy content used as material
RPR_T	Total use of renewable primary energy resources
$NPRP_E$	Non-renewable primary resources used as an energy carrier (fuel)
$NPRP_M$	Non-renewable primary resources with energy content used as material
$NPRP_T$	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
RE	Use of recovered energy
FW	Use of net fresh water
Output flows and waste categories	
HWD	Hazardous waste disposed
NHWD	Non-hazardous waste disposed
HLRW	High-level radioactive waste, conditioned, to final repository
ILLRW	Intermediate- and low-level radioactive waste conditioned to final repository
CRU	Components for re-use
MFR	Materials for recycling
MER	Materials for energy recovery
EE	Exported energy

Table 8: LCIA results for FU of CavityBoard produced by PowerWool Insulation.

Indicators	Units	A1	A2	A3	A4	A5	C2	C4
Global Warming Potential (GWP100) IPCC 2013	kg CO2 eq	2.10E+00	9.51E-02	4.06E+00	1.50E+00	2.22E-01	2.60E-02	5.85E-02
Ozone Depletion Potential (ODP)	kg CFC-11-Eq	3.54E-08	1.77E-09	1.02E-07	1.20E-08	1.01E-09	9.28E-11	1.51E-09
Acidification Potential (AP)	kg SO2-Eq	8.45E-03	2.30E-04	2.09E-02	2.57E-02	4.90E-04	3.30E-04	3.72E-03
Eutrophication Potential (EP)	kg PO4-Eq	5.33E-03	8.12E-05	7.46E-03	1.54E-03	1.90E-04	2.40E-05	1.50E-04
Photochemical Ozone Formation	kg O3 Eq	1.19E-01	4.03E-03	2.28E-01	5.94E-01	1.06E-02	9.35E-03	9.54E-03
Abiotic Resource Depletion Potential (ADP): fossil fuels	MJ	6.19E+00	1.89E-01	2.43E+00	2.88E+00	9.52E-02	5.32E-02	1.63E-01
Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project								

Table 9: LCIA results for FU of RigiBoard ONE produced by PowerWool Insulation.

Indicators	Units	A1	A2	A3	A4	A5	C2	C4
Global Warming Potential (GWP100) IPCC 2013	kg CO2 eq	4.65E+00	3.62E-01	7.53E+00	3.07E+00	3.78E-01	5.35E-02	1.20E-01
Ozone Depletion Potential (ODP)	kg CFC-11-Eq	7.79E-08	6.72E-09	1.89E-07	2.46E-08	9.85E-10	1.91E-10	3.09E-09
Acidification Potential (AP)	kg SO2-Eq	1.86E-02	8.60E-04	3.87E-02	5.26E-02	4.30E-04	6.90E-04	7.64E-03
Eutrophication Potential (EP)	kg PO4-Eq	1.18E-02	3.10E-04	1.39E-02	3.15E-03	2.40E-04	4.94E-05	3.10E-04
Photochemical Ozone Formation	kg O3 Eq	2.62E-01	1.53E-02	4.24E-01	1.22E+00	1.04E-02	1.92E-02	1.96E-02
Abiotic Resource Depletion Potential (ADP): fossil fuels	MJ	1.37E+01	7.20E-01	4.50E+00	5.90E+00	9.21E-02	1.09E-01	3.36E-01
Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project								

Table 10: Resource use per FU of CavityBoard produced by PowerWool Insulation.

Environmental Indicator	Unit	CavityBoard - 2"						
		A1 (per FU)	A2 (per FU)	A3 (per FU)	A4 (per FU)	A5 (per FU)	C2 (per FU)	C4 (per FU)
Resource use								
RPR_E(1)	MJ, LHV	1.24E+00	1.81E-02	1.29E+00	7.23E-02	1.26E-01	7.00E-04	2.14E-02
RPR_M(2)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PER_T	MJ, LHV	1.24E+00	1.81E-02	1.29E+00	7.23E-02	1.26E-01	7.00E-04	2.14E-02
$NRPR_E$(3)	MJ, LHV	5.17E+01	1.43E+00	4.25E+01	2.07E+01	3.20E+00	3.82E-01	1.25E+00
$NRPR_M$(4)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_T$	MJ, LHV	5.17E+01	1.43E+00	4.25E+01	2.07E+01	3.20E+00	3.82E-01	1.25E+00
SM	MJ, LHV	6.10E-01	0.00E+00	0.00E+00	0.00E+00	1.22E-02	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
RE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW(5)	m^3	0.00E+00	0.00E+00	1.53E-02	0.00E+00	3.06E-04	0.00E+00	0.00E+00
RPR_E : Renewable Primary Resources Used as Energy Carrier (Fuel); **RPR_M**: Renewable Primary Resources with Energy Content Used as Material; **PER_T**: Total use of renewable primary energy resources; **$NRPR_E$**: Non-Renewable Primary Resources Used as Energy Carrier (Fuel); **$NRPR_M$**: Non-Renewable Primary Resources with Energy Content Used as Material; **$NRPR_T$**: Non-Renewable Primary Resources Total; **SM**: Secondary Materials; **RSF**: Renewable Secondary Fuels; **NRSF**: Non-Renewable Secondary Fuels; **RE**: Recovery energy; **FW**: Use of Net Fresh Water Resources.								
Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project								

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED methodology (LHV).
(2) Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED methodology (LHV).
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption.

Table 11: Resource use per FU of RigiBoard ONE produced by PowerWool Insulation.

Environmental Indicator	Unit	RigiBoard One - 2"						
		A1 (per FU)	A2 (per FU)	A3 (per FU)	A4 (per FU)	A5 (per FU)	C2 (per FU)	C4 (per FU)
Resource use								
RPR_E(1)	MJ, LHV	2.74E+00	6.89E-02	2.40E+00	1.48E-01	1.80E-01	1.45E-03	4.39E-02
RPR_M(2)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PER_T	MJ, LHV	2.74E+00	6.89E-02	2.40E+00	1.48E-01	1.80E-01	1.45E-03	4.39E-02
$NRPR_E$(3)	MJ, LHV	1.14E+02	5.45E+00	7.89E+01	4.25E+01	5.67E+00	7.86E-01	2.58E+00
$NRPR_M$(4)	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_T$	MJ, LHV	1.14E+02	5.45E+00	7.89E+01	4.25E+01	5.67E+00	7.86E-01	2.58E+00
SM	MJ, LHV	1.23E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-02	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
RE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW(5)	m^3	0.00E+00	0.00E+00	2.84E-02	0.00E+00	5.69E-04	0.00E+00	0.00E+00
RPR_E : Renewable Primary Resources Used as Energy Carrier (Fuel); **RPR_M**: Renewable Primary Resources with Energy Content Used as Material; **PER_T**: Total use of renewable primary energy resources; **$NRPR_E$**: Non-Renewable Primary Resources Used as Energy Carrier (Fuel); **$NRPR_M$**: Non-Renewable Primary Resources with Energy Content Used as Material; **$NRPR_T$**: Non-Renewable Primary Resources Total; **SM**: Secondary Materials; **RSF**: Renewable Secondary Fuels; **NRSF**: Non-Renewable Secondary Fuels; **RE**: Recovery energy; **FW**: Use of Net Fresh Water Resources.								
Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project								

(1): $RPR_E = RPR_T - RPR_M$, where RPR_T is equal to the value for renewable energy obtained using the CED methodology (LHV).
(2) Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPR_M.
(3): $NRPR_E = NRPR_T - NRPR_M$, where $NRPR_T$ is equal to the value for non-renewable energy obtained using the CED methodology (LHV).
(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, $NRPR_M$.
(5): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption.

Table 12: Output flows and waste for FU of CavityBoard produced by PowerWool Insulation.

Environmental Indicator	Unit	CavityBoard - 2”						
		A1 (per FU)	A2 (per FU)	A3 (per FU)	A4 (per FU)	A5 (per FU)	C2 (per FU)	C4 (per FU)
Output flows and waste categories								
HWD(1)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD(2)	kg	0.00E+00	0.00E+00	2.32E-01	0.00E+00	1.24E-01	0.00E+00	0.00E+00
HLRW(3)	m^3	1.05E-09	1.68E-11	2.21E-09	3.98E-11	9.39E-11	2.72E-14	2.03E-11
ILLRW(4)	m^3	5.49E-09	8.85E-11	1.13E-08	2.08E-10	4.84E-10	1.61E-13	1.10E-10
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD: Hazardous Waste Disposed; **NHWD**: Non-Hazardous Waste Disposed; **RWD**: Radioactive Waste Disposed; **HLRW**: High-Level Radioactive Waste, Conditioned, to Final Repository; **ILLRW**: Intermediate and Low-Level Radioactive Waste, Conditioned, to Final Repository; **CRU**: Components for Re-Use; **MFR**: Materials for Recycling; **MER**: Materials for Energy Recovery; **EE**: Exported Energy.								
Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project								

(1): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste."

(2): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive" and EPD values.

(3): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."

(4): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

Table 13: Output flows and waste for FU of RigiBoard ONE produced by PowerWool Insulation.

Environmental Indicator	Unit	RigiBoard One - 2”						
		A1 (per FU)	A2 (per FU)	A3 (per FU)	A4 (per FU)	A5 (per FU)	C2 (per FU)	C4 (per FU)
Output flows and waste categories								
HWD(1)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD(2)	kg	0.00E+00	0.00E+00	4.32E-01	0.00E+00	6.62E-02	0.00E+00	0.00E+00
HLRW(3)	m^3	2.32E-09	6.40E-11	4.10E-09	8.12E-11	1.58E-10	5.60E-14	4.17E-11
ILLRW(4)	m^3	1.21E-08	3.37E-10	2.09E-08	4.24E-10	8.16E-10	3.32E-13	2.26E-10
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD: Hazardous Waste Disposed; **NHWD**: Non-Hazardous Waste Disposed; **RWD**: Radioactive Waste Disposed; **HLRW**: High-Level Radioactive Waste, Conditioned, to Final Repository; **ILLRW**: Intermediate and Low-Level Radioactive Waste, Conditioned, to Final Repository; **CRU**: Components for Re-Use; **MFR**: Materials for Recycling; **MER**: Materials for Energy Recovery; **EE**: Exported Energy.

Note: B1, B2, B3, B4, B5, B6, B7, C1 and C3 are assumed null for this EPD project

(1): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste."
(2): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive" and EPD values.
(3): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository."
(4): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository."

4.2. CONTRIBUTION ANALYSIS

As illustrated in the figures below, manufacturing (A3 modules) is the major contributor to three of the six potential impact categories assessed (GWP, ODP and EP). The relative impacts are between 47% to 67% of the total impacts for all products. The Impact contribution of module A3 (manufacturing) comes from energy consumption from coal coke, the electricity gid mix and natural gas. Extraction and upstream production (A1 modules) is a major contributor for ADP fossil impact categories. The relative impacts for impact categories are between 12% to 54% of the total impacts for all products. The Impact contribution of A1 modules come from phenolic resin production. The contribution of phenolic resin production represents around 89% of the total impact for the GWP impact category. Distribution modules (A4) is a major contributor with a highest contribution for AP and the photochemical oxidant formation impact categories. The relative impacts for impact categories are between 8% to 62% of the total impacts for all products. For module A4, sea transport from China to the Canada warehouse and truck distribution across North America represent around 35% and 65% of the total impacts, respectively. See Figures 3 and 4 below.

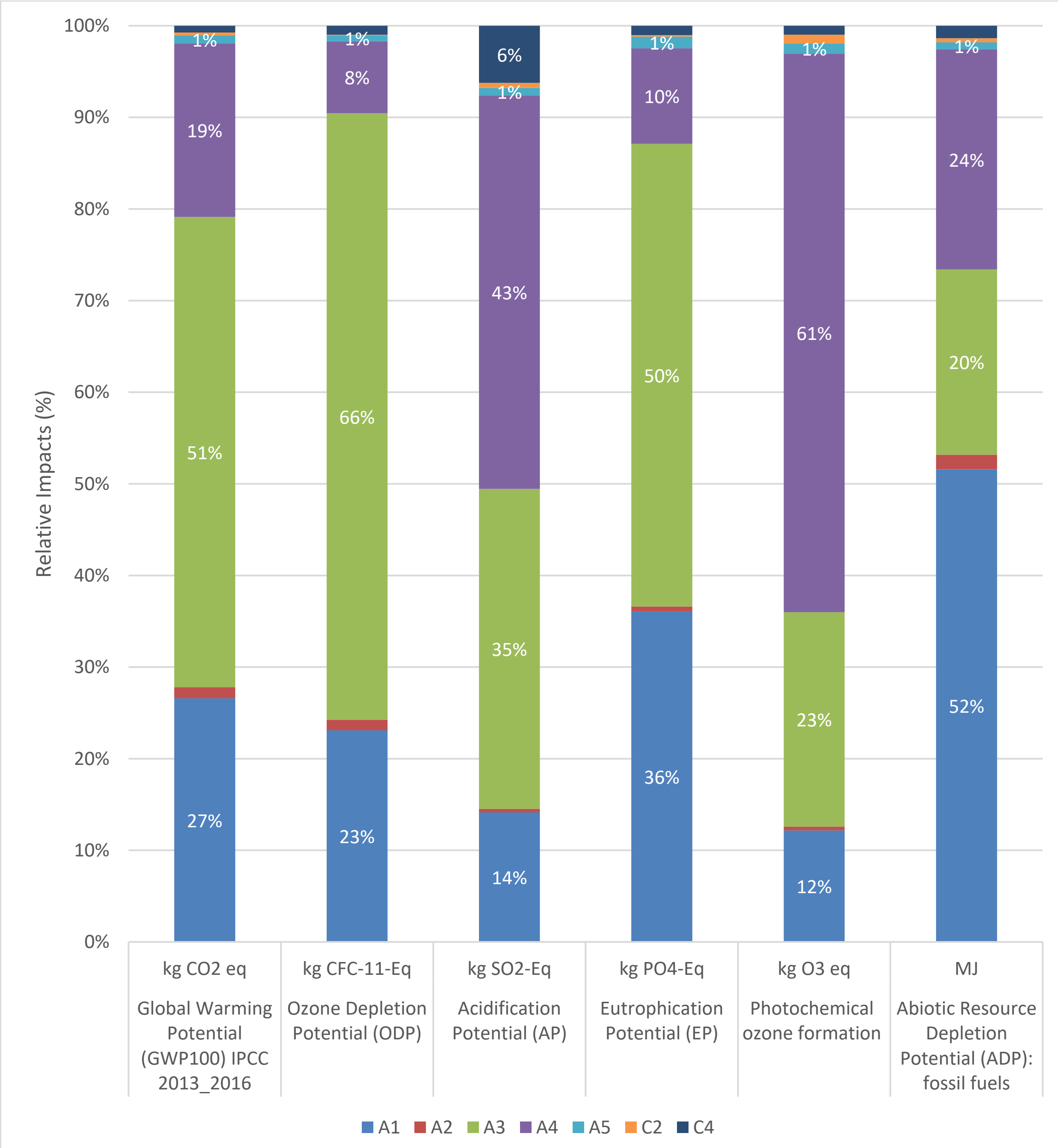

Figure 3: Contribution of life cycle stages to the environmental impacts of 1 m^2 per CavityBoard 2" panel.

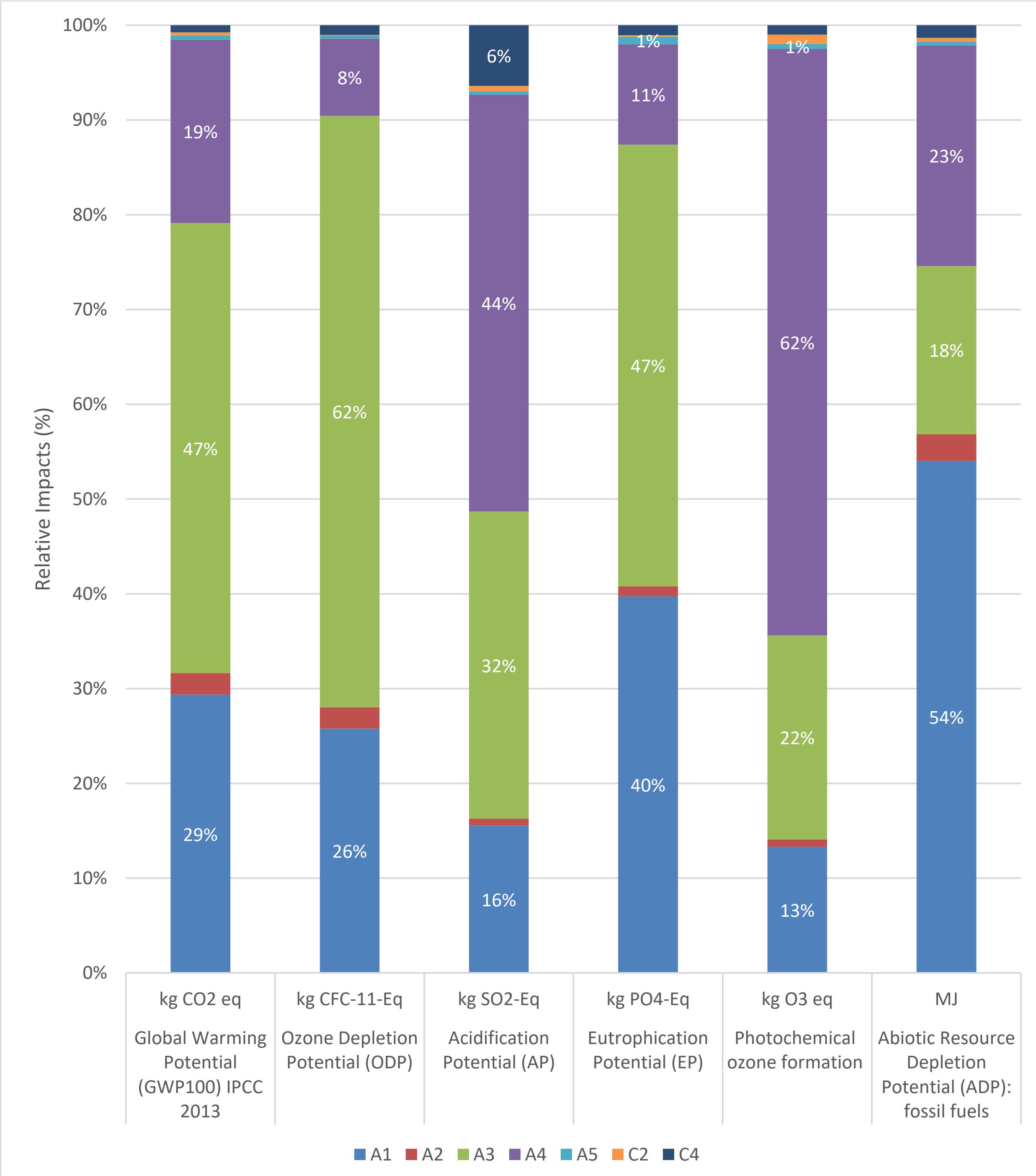

Figure 4: Contribution of life cycle stages to the environmental impacts per 1 m^2 of RigiBoard One 2” panel.

5. ADDITIONAL ENVIRONMENTAL INFORMATION

5.1. REGULATED HAZARDOUS SUBSTANCES

No substances required to be reported as hazardous are associated with the products.

5.2. DANGEROUS SUBSTANCES

No dangerous substances are known to be associated with the production of the products.

6. REFERENCES

[1] ISO 14025, “Environmental labels and declarations – Type III environmental declarations – Principles and procedures,” Geneva, Switzerland, Jul. 2006[Online]. Available: https://www.iso.org/standard/38131.html.

[2] UL Solutions, “Product Category Rules for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements,” 2022[Online]. Available: https://www.shopulstandards.com/ProductDetail.aspx?productId=ULE10010_6_S_20220328.

[3] UL Solutions, “Product Category Rule (PCR) Guidance for Building-Related Products and Services Part B: Building Envelope Thermal Insulation EPD Requirements,” November 2025.

[4] ISO 21930, “Sustainability in buildings and civil engineering works-Core rules for environmental product declarations of construction products and services,” Geneva, Switzerland, Jul. 2017[Online]. Available: https://www.iso.org/standard/61694.html.

[5] ISO 14040, “Environmental management – Life cycle assessment - Principles and framework,” Geneva, Switzerland, Jul. 2006[Online]. Available: https://www.iso.org/standard/37456.html.

[6] U.S. Life Cycle Inventory Database, “National Renewable Energy Laboratory,” 2012[Online]. Available: https://www.lcacommons.gov/nrel/search.

PowerWool Insulation Inc.

#107 - 3757 190th Street

Surrey, BC

V3Z 0P6 Canada

www.powerwoolinsulation.com

This LCA and EPD were prepared by Vertima Inc.

604 Saint Viateur Street
Quebec, QC
(418) 990-2800
G2L 2K8 CANADA

Environmental certification experts

vertima.ca