ezoBord™

VERIFIED by SCS GLOBAL SERVICES
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

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Product
ezoBord PET Acoustical Panel

Functional Unit
The functional unit is one square meter of ceiling panel product over a 75-year period

EPD Number and Period of Validity
SCS-EPD-05286
EPD Valid January 7, 2019 through January 6, 2024
Version: February 26, 2019

Product Category Rule
ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.

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SCSglobal SERVICES

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Disclaimers: *This EPD conforms to ISO 14025, 14040, ISO 14044, and ISO 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.

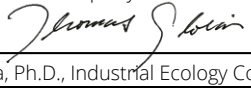
Approved Date: January 7, 2019 – End Date: January 6, 2024

ISO 21930:2017 - serves as the core PCR

Independent verification of the declaration and data, according to ISO 14025:2006.
ISO 21903:2017 serves as the core PCR

☐ internal ☑ external

Third party verifier:



Tom Gloria, Ph.D., Industrial Ecology Consultants

1. About iVekter, Inc.

iVekter is the exclusive manufacturer of ezoBord. Founded in Canada in 2004, iVekter has grown the business worldwide through partnerships with multiple national distribution/fabrication companies dedicated to providing support of the ezoBord brand in the respective markets. Constantly working to be a leader in the acoustics business, iVekter is fully engaged in constant Research & Development, working with Architects, Designers, Dealers, and Engineers to continually evolve the ezoBord material into limitless products and applications.

2. Product

2.1 Product Description

ezoBord is a new generation high performance acoustical/tackable material. ezoBord offers unlimited design potential to enable architects and designers to redefine and reinvent custom acoustical applications for any space.

2.2 Application

ezoBord's PET panels are intended for decorative wall and ceiling acoustical panels, office partitions, acoustic tack boards, visual and acoustical full height privacy barriers and other custom applications for use in commercial interiors.

2.3 Technical Data

Table 1. *Product specifications for the ezoBord Ceiling Panel Products.*

Property	Test Method	Test Results	
Building Code Classification	2015 Intl. Building Code Sec. 803.1.1	Class A	
Flame Spread Index	ASTM E84	25	
Smoke Developed Index	ASTM E84	350	
Sound Absorption Coefficient	ASTM C423 (D50 mounting method)	0.76	
Noise Reduction Coefficient	ASTM C423 (D50 mounting method)	0.75	
Fire Growth Rate - $FIGRA_{0.2MJ}$ (W/s)	EN 13823:2014	0.00	
Fire Growth Rate - $FIGRA_{0.4MJ}$ (W/s)	EN 13823:2015	0.00	
Total Heat Release - THR (MJ)	EN 13823:2016	0.20	
Total Smoke Production - TSP (m2)	EN 13823:2017	8.75	
Smoke Growth Rate - SMOGRA (m2/s2)	EN 13823:2018	0.00	
Lateral Flame Spread - LFS	EN 13823:2019	None	
Flame Spread (30s exposure - surface)	EN ISO 11925-2:2010	F_s	62.5 m
		Flaming droplets	None
Flame Spread (30s exposure - edge)	EN ISO 11925-2:2010	F_s	38.3 m
		Flaming droplets	None

2.4 Delivery Status

Product dimensions vary by installation. Standard sheet panel dimensions are summarized in Table 2

Table 2. *ezoBord ceiling panel products dimensions.*

Parameter	Value	
Thickness	9 mm (3/8"); standard	12 mm (1/2")
Sheet Dimensions	1,219 mm (48") x 2,440 mm (96)	1,219 mm (48") x 2,750 mm (108")
Thickness	9 mm (3/8"); standard	12 mm (1/2")
Weight/Sheet	3.85 kg (8.5 lb)	7.27 kg (16.0 lb)
Density	1.30 kg/m^2 (0.266 lb/ft^2)	2.17 kg/m^2 (0.444 lb/ft^2)

2.5 Base Materials

The primary materials include polyester sheet container 50% post-consumer recycled material, and adhesives. Packaging materials consist of plastic wrap and cardboard.

Table 3. *Material content for the ezoBord ceiling panel products, per square meter.*

Component	Material	ezoBord 9mm		ezoBord 12mm	
		(kg/m^2)	(%)	(kg/m^2)	(%)
Product					
PET sheet / ezoBord	Polyester (50% recycled)	1.1	85%	1.91	88%
ezoTape	Polyurethane tape	0.1	7.70%	0.13	6.10%
PL Construction Adhesive	Acrylic adhesive	0.1	7.70%	0.13	6.10%
Total Product		**1.3**	**100%**	**2.17**	**100%**
Packaging					
Packaging	Packaging film (LDPE)	0.1	25%	0.1	25%
Packaging	Bubble wrap (PUR)	$5.0x10^{-2}$	13%	$5.0x10^{-2}$	13%
Packaging	Corrugated	0.25	63%	0.25	63%
Total Packaging		**0.4**	**100%**	**0.4**	**100%**

2.6 Manufacture

ezoBord's acoustic ceiling panels are manufactured at two production facilities, *Ayrsonics* in Kitchener, Ontario and *Vervia* in Elgin, Illinois. The primary component materials include polyester (PET) sheet, containing a minimum of 50% post-consumer recycled content, and adhesives. Resources use at the fabrication facilities is allocated to the product based on mass.

2.7 Environment and Health during Manufacture

No environmental or health impacts are expected during the manufacture of the ceiling panel product.

2.8 Product Processing/Installation

Typical installation is accomplished using adhesive tape included with the product and hand tools.

2.9 Packaging

The ezoBord products are packaged for shipment using plastic wrap and cardboard cartons.

2.10 Condition of Use

No special conditions of use are noted.

2.11 Environment and Health during use

No environmental or health impacts are expected due to normal use of the ceiling panel product.

2.12 Reference Service Life

The Reference Service Life (RSL) of the ceiling panel product is 75 years.

2.13 Extraordinary Effects

No environmental or health impacts are expected due to extraordinary effects including fire and/or water damage and product destruction.

2.14 Re-Use Phase

The ceiling panel product is not typically reused or recycled at end-of-life.

2.15 Disposal

At end-of-life, the products may be recycled or disposed of in a landfill or via incineration.

Society of the Plastics Industry (SPI) Resin Identification Code: Plastic #1: Polyethylene Terephthalate (PET)

2.16 Further Information

Further information on the product can be found on the manufacturers' website at http://ezobord.com/.

3. LCA: Calculation Rules

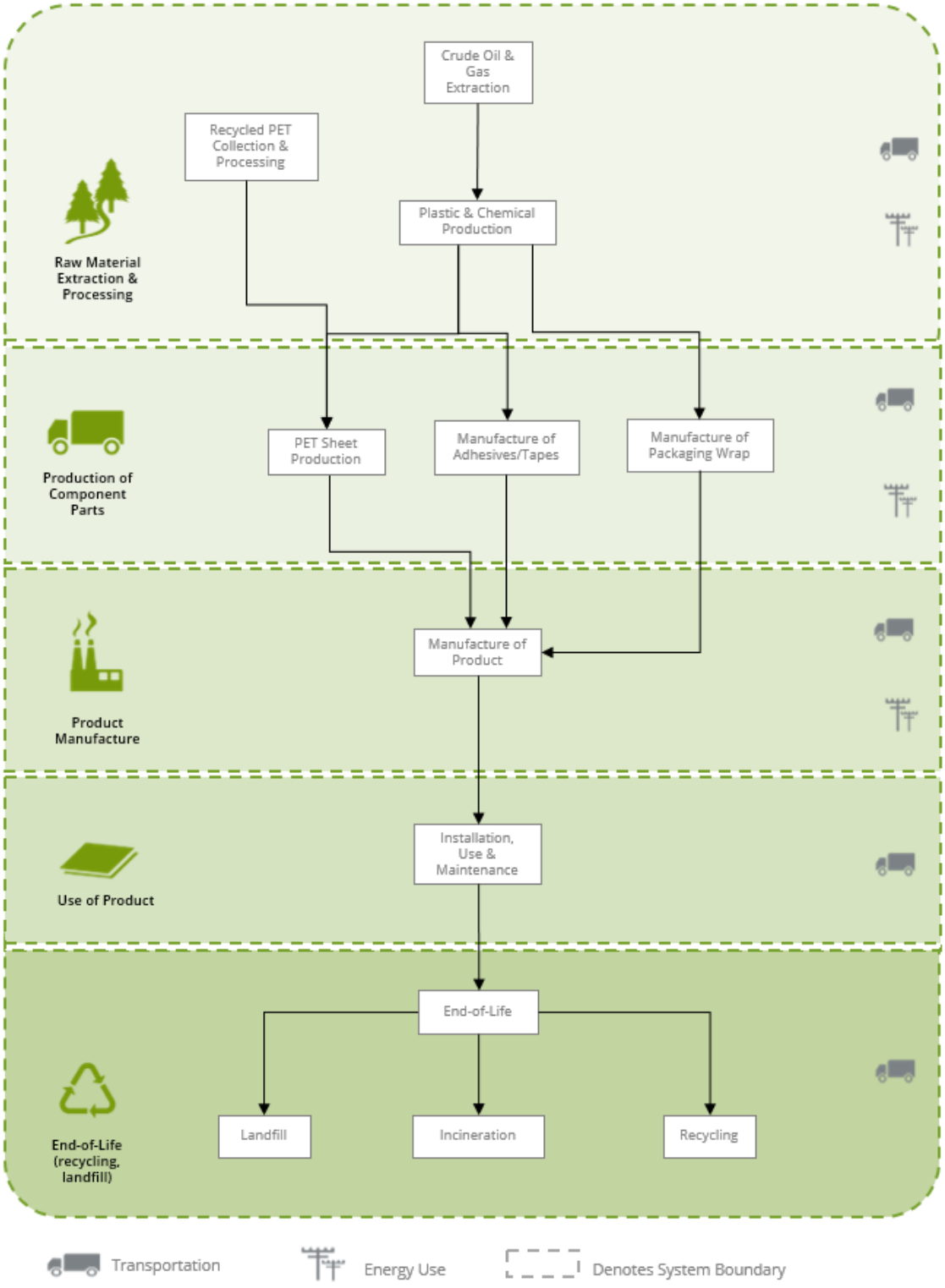
3.1 Functional Unit

The functional unit used in the study is defined as 1 m^2 of ceiling panel installed for use over a 75-year period. The reference flow for the product system is 1.30 kg/m^2 for the 9 mm product and 2.17 kg/m^2 for the 12 mm product.

Parameter	Value		Unit
	ezoBord - 9 mm	ezoBord - 12 mm	
Thickness of panel	0.009	0.012	m
Gross density	144.4	180.8	kg/m^3
Conversion factor to 1 kg	0.769	0.461	-
Declared unit	1.00	1.00	m^2
Declared unit	1.30	2.17	kg
Proportion of joints	-	-	%

3.2 System Boundary

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The life cycle phases included in the product system boundary are shown below.



3.3 Estimates and Assumptions

- The Elgin, Illinois facility is located in the RFCW eGRID EPA NERC subregion. An Ecoinvent inventory dataset was modified to reflect the eGRID energy mix for RFCW to estimate resource use and emissions from electricity use at the manufacturing facility. Electricity use at the Kitchener, Ontario facility is based on regional Ecoinvent data for Canada.
- Electricity use at the production facilities were allocated to the ceiling panel products based on product mass utilizing production data for calendar year 2017 provided by the manufacturer.
- Material data for various components of the ceiling panel products were provided by the manufacturer. The extraction and processing of raw materials for the primary polyester component material could not be modeled with actual process information. Representative data from the Ecoinvent LCI databases were utilized as appropriate.
- Specific data were not available for adhesives used in the products. Based on the SDS of these chemicals, secondary datasets on acrylic binders and dispersions from the Ecoinvent database were used to represent these chemicals in the LCA model.
- Disposal of product and packaging is modeled based on regional statistics regarding municipal solid waste generation and disposal in the United States. The data include end-of-life recycling rates of packaging and product materials.
- For final disposal of the product and packaging material at end-of-life, all materials are assumed to be transported 20 miles by diesel truck to either a landfill, incineration facility, or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.

It should also be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The PCR allows for the results for several inventory flows related to construction products to be reported as “other parameters”. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.4 Cut-off criteria

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD

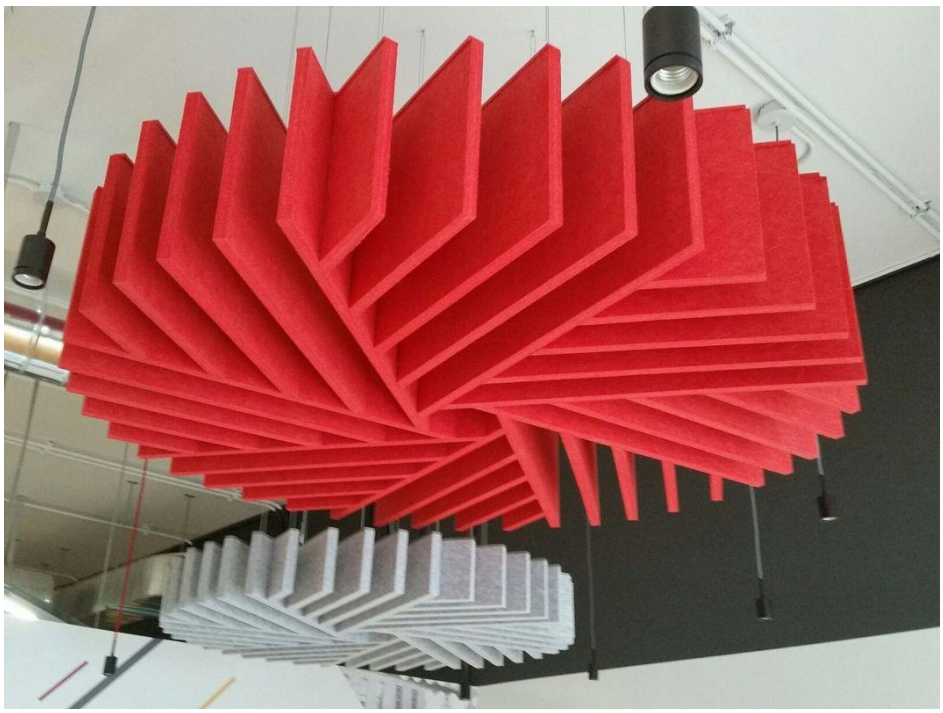
3.5 Background Data

Primary data were provided by ezoBord for the Elgin, Illinois and Kitchener, Ontario manufacturing facilities. The sources of secondary LCI data are the Ecoinvent database.

Table 4. *Data sources for the ezoBord product system.*

Component	Material Description	Material Dataset	Data Source	Publication Date
PRODUCT				
PET Fibers / ezoBord	Polyethylene terephthalate, granulate, amorphous {RoW}| production; Recycled postconsumer PET pellet {GLO} | market for	Extrusion of plastic sheet and thermoforming, inline {RoW} | Market for	Ecoinvent[1]; Ecoinvent[1]	2016; 2016
ezoTape	Acrylic dispersion, without water, in 65% solution state {GLO} | market for	Including in manufacturing process	Ecoinvent[1]	2016
PL Construction Adhesive	Polyurethane, flexible foam {GLO}| market for	Including in manufacturing process	Ecoinvent[1]	2016
PACKAGING				
Cardboard	Corrugated board box {GLO}| market for corrugated board box	Included in dataset	Ecoinvent[1]	2016
Packaging film	Packaging film, low density polyethylene, granulate {GLO}| market for	Included in dataset	Ecoinvent[1]	2016
Packaging foam	Polyurethane, flexible foam {GLO}| market for	Included in dataset	Ecoinvent[1]	2016
RESOURCES				
Regional electricity mix	Electricity, medium voltage {CA-ON}| market for | Alloc Rec, U	n/a	Ecoinvent[1]	2016
Regional electricity mix	Electricity, medium voltage, at grid/RFCW 2015	n/a	Ecoinvent[2]	2015
TRANSPORTATION				
Truck	Transport, freight, lorry 16-32 metric ton, EURO4 {GLO} | market for	n/a	Ecoinvent[1]	2016
Ship	Transport, freight, sea, transoceanic ship {GLO} | market for	n/a	Ecoinvent[1]	2016

1) Ecoinvent v3.3 Life Cycle Database
2) Ecoinvent v2.2 Life Cycle Database



3.6 Data Quality

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 5. *Data quality assessment for the ezoBord product system.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2015 or more recent). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annual production for 2017.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily North American. Surrogate data used in the assessment are representative of North American or European operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing product disposal are based on US statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the ceiling panel products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded. In total, these missing data represent less than 5% of the mass or energy flows.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used with a bias towards Ecoinvent v3.2 data where available. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in the United States.
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	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the *AyrSonics* and *Vervia* manufacturing facilities represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. The Ecoinvent database is used for secondary LCI datasets.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the panel products and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years), but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.7 Period under review

The period of review is calendar year 2017.

3.8 Allocation

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported. Life cycle impact results are presented for a production weighted average for the two manufacturing facilities.

The product system includes some recycled materials, which were allocated using the recycled content allocation method (also known as the 100-0 cut-off method). Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At end-of-life, materials which are recycled leave the system boundaries with no additional burden.

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.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Distribution of the panel products to the point of installation assumed a transport distance of 1,030 km by diesel truck from the *Ayrsonics* production facility and 2,400 km by diesel truck from the *Vervia* facility. Transportation parameters for modeling are summarized in Table 6.

Table 6. *Transport parameters, per m^2 (A4)*

Parameter	Value	Unit
Transport distance from *Ayrsonics* (truck)	1,030	km
Transport distance from *Vervia* (truck)	2,400	km
Gross mass of products transported – 9 mm	1.70	kg
Gross mass of products transported – 12 mm	2.57	kg

Installation of the product is accomplished using hand tools with no associated emissions and negligible impacts and no waste generated. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

Use stage (B1)

No impacts are associated with the use of the product over the Reference Service Lifetime.

Maintenance stage (B2)

The panel product can be cleaned and maintained by removing dust and dirt with a stiff plastic bristle brush, with no associated impacts.

Repair/Replacement/Refurbishment stage (B3 - B5)

Product repair, replacement and refurbishment are not relevant during the lifetime of the product. No product replacements are required over the 75 year building lifetime.

Building operation stage (B6 – B7)

There is no operational energy or water use associated with the use of the product and the results for these stages are zero.

Disposal stage (C1 - C4)

The disposal stage includes demolition of the products (*C1*); transport of the panel products to waste treatment facilities (*C2*); waste processing (*C3*); and associated emissions as the product degrades in a landfill or is burned in an incinerator (*C4*). For the ezoBord products, no emissions are generated during demolition (*C1*) while no waste processing (*C3*) is required for incineration or landfill disposal. Transportation of waste materials at end-of-life (*C2*) assumes a 20-mile average distance to disposal, consistent with assumptions used in the US EPA WARM model. The relevant recycling rates used for the product and packaging are based on regional statistics regarding municipal solid waste generation and disposal in the United States for 2015, from the US Environmental Protection Agency. The data include end-of-life recycling rates of packaging and product materials. The relevant recycling rates used for the product and packaging are summarized in Table 7.

Table 7. *Recycling rates for materials at end-of-life.*

Material	Product	Packaging
Plastics	6.6%	14.6%
Paper and paperboard	n/a	78.2%

5. LCA: Results

Results of the Life Cycle Assessment are presented below. 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.

Table 8. *Life cycle phases included in the product system boundary.*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	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	X	X	X	X	X	X	X	X	X	X	X	MND

The following environmental impact category indicator are reported using characterization factors based on the U.S. EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts – TRACI:

Impact Category	Unit
Global Warming Potential (GWP 100)	kg CO_2 eq
Ozone Depletion Potential (ODP)	kg CFC 11 eq
Acidification Potential (AP)	kg SO_2 eq
Eutrophication Potential (EP)	kg N eq
Smog Formation Potential (POCP)	kg O_3 eq
Fossil Fuel Depletion Potential (FFD)	MJ Surplus, LHV

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

The following optional environmental impact category indicators are also reported based on the CML-IA characterization factors:

Impact Category	Unit
Global Warming Potential (GWP 100)	kg CO_2 eq
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq
Acidification Potential of soil and water (AP)	kg SO_2 eq
Eutrophication Potential (EP)	kg PO_4^{3-} eq
Photochemical Oxidant Creation Potential (POCP)	kg C_2H_4 eq
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ, LHV

Table 9. *CML Life Cycle Impact Assessment (LCIA) results for the 9mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Global warming (GWP, 100 year)	kg CO_2 eq	4.8	0.10	1.2	0.50	0.16	$7.9x10^{-3}$	0.76	MND
	%	64%	1.4%	16%	6.6%	2.1%	0.10%	10%	
Acidification	kg SO_2 eq	$2.7x10^{-2}$	$4.2x10^{-4}$	$6.0x10^{-3}$	$2.0x10^{-3}$	$5.2x10^{-5}$	$3.1x10^{-5}$	$2.4x10^{-4}$	MND
	%	76%	1.2%	17%	5.5%	0.14%	0.09%	0.67%	
Eutrophication	kg $(PO_4)^{3-}$ eq	$7.6x10^{-3}$	$9.4x10^{-5}$	$1.8x10^{-3}$	$4.4x10^{-4}$	$1.0x10^{-3}$	$7.1x10^{-6}$	$7.9x10^{-3}$	MND
	%	40%	0.50%	9.8%	2.4%	5.4%	0.04%	42%	
Ozone depletion	kg CFC-11 eq.	$2.9x10^{-7}$	$1.9x10^{-8}$	$4.3x10^{-8}$	$9.1x10^{-8}$	$1.0x10^{-9}$	$1.5x10^{-9}$	$5.8x10^{-9}$	MND
	%	64%	4.3%	9.6%	20%	0.23%	0.32%	1.3%	
Smog	kg C_2H_4 eq	$1.3x10^{-3}$	$1.8x10^{-5}$	$2.8x10^{-4}$	$8.4x10^{-5}$	$1.8x10^{-5}$	$1.3x10^{-6}$	$4.3x10^{-5}$	MND
	%	75%	1.0%	16%	4.8%	1.0%	0.08%	2.4%	
Abiotic depletion (elements)	kg Sb eq	$1.1x10^{-5}$	$3.1x10^{-7}$	$9.8x10^{-7}$	$1.5x10^{-6}$	$1.1x10^{-8}$	$2.3x10^{-8}$	$3.9x10^{-8}$	MND
	%	80%	2.2%	7.0%	10%	0.08%	0.17%	0.28%	
Abiotic depletion (fossil fuels)	MJ	80	1.7	20	7.9	0.10	0.13	0.57	MND
	%	72%	1.5%	18%	7.1%	0.09%	0.11%	0.51%	

Table 10. *TRACI Life Cycle Impact Assessment (LCIA) results for the 9mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Global warming (GWP, 100 year)	kg CO_2 eq	4.7	0.10	1.2	0.49	0.14	$7.8x10^{-3}$	0.73	MND
	%	64%	1.4%	16%	6.7%	2.0%	0.11%	9.8%	
Acidification	kg SO_2 eq	$2.7x10^{-2}$	$4.8x10^{-4}$	$5.9x10^{-3}$	$2.3x10^{-3}$	$6.5x10^{-5}$	$3.6x10^{-5}$	$3.0x10^{-4}$	MND
	%	75%	1.3%	16%	6.4%	0.18%	0.10%	0.83%	
Eutrophication	kg N eq	$1.5x10^{-2}$	$1.2x10^{-4}$	$3.7x10^{-3}$	$5.5x10^{-4}$	$2.6x10^{-3}$	$8.8x10^{-6}$	$2.1x10^{-2}$	MND
	%	35%	0.27%	8.5%	1.3%	6.0%	0.02%	49%	
Ozone depletion	kg CFC-11 eq	$2.9x10^{-7}$	$1.9x10^{-8}$	$4.2x10^{-8}$	$9.1x10^{-8}$	$1.0x10^{-9}$	$1.5x10^{-9}$	$5.8x10^{-9}$	MND
	%	64%	4.3%	9.5%	20%	0.23%	0.32%	1.3%	
Smog	kg O_3 eq	0.29	$1.1x10^{-2}$	$6.1x10^{-2}$	$5.3x10^{-2}$	$1.5x10^{-3}$	$8.5x10^{-4}$	$6.9x10^{-3}$	MND
	%	68%	2.7%	14%	13%	0.36%	0.20%	1.6%	
Fossil fuel depletion	MJ surplus	8.9	0.23	2.3	1.1	$1.3x10^{-2}$	$1.7x10^{-2}$	$7.4x10^{-2}$	MND
	%	71%	1.8%	18%	8.6%	0.10%	0.14%	0.58%	

MND = Module not declared

Table 11. *Resource use for the 9mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ	4.3	$2.0x10^{-2}$	3.0	$9.6x10^{-2}$	$3.0x10^{-3}$	$1.5x10^{-3}$	$2.0x10^{-2}$	MND
	%	58%	0.28%	40%	1.3%	0.04%	0.02%	0.27%	
Use of renewable primary energy resources used as raw materials	MJ	-	-	-	-	-	-	-	MND
Total use of renewable primary energy resources	MJ	4.3	$2.0x10^{-2}$	3.0	$9.6x10^{-2}$	$3.0x10^{-3}$	$1.5x10^{-3}$	$2.0x10^{-2}$	MND
	%	58%	0.28%	40%	1.3%	0.04%	0.02%	0.27%	
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	MND
Use of non-renewable primary energy resources used as raw materials	MJ.	INA	INA	INA	INA	INA	INA	INA	MND
Total use of non-renewable primary energy resources	MJ	88	1.7	26	8.0	0.11	0.13	0.59	MND
	%	71%	1.4%	21%	6.4%	0.08%	0.10%	0.47%	
Use of secondary materials	Kg	0.55	-	-	-	-	-	-	MND
	%	100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Use of renewable secondary fuels	MJ	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Use of non-renewable secondary fuels	MJ	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND

MND = Module not declared
INA = Indicator not assessed
Neg. = Negligible

Table 12. *Waste and outflows for the 9mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Non-hazardous waste disposed	kg	$2.2x10^{-4}$	$9.5x10^{-7}$	$1.6x10^{-5}$	$4.5x10^{-6}$	$9.5x10^{-8}$	$7.2x10^{-8}$	$7.4x10^{-7}$	MND
	%	91%	0.39%	6.7%	1.8%	0.04%	0.03%	0.30%	
Hazardous waste disposed	kg	0.42	$7.5x10^{-2}$	$8.0x10^{-2}$	0.35	0.15	$5.6x10^{-3}$	1.7	MND
	%	15%	2.7%	2.9%	13%	5.6%	0.20%	61%	
Radioactive waste disposed (high-level)	kg	$2.5x10^{-5}$	$1.0x10^{-7}$	$3.8x10^{-5}$	$4.7x10^{-7}$	$1.5x10^{-8}$	$7.5x10^{-9}$	$6.6x10^{-8}$	MND
	%	40%	0.16%	59%	0.74%	0.02%	0.01%	0.10%	
Radioactive waste disposed (low-level)	kg	$1.3x10^{-4}$	$1.1x10^{-5}$	$3.5x10^{-5}$	$5.1x10^{-5}$	$5.2x10^{-7}$	$8.2x10^{-7}$	$2.9x10^{-6}$	MND
	%	57%	4.6%	15%	22%	0.22%	0.35%	1.2%	
Components for re-use	kg	0	0	0	0	0	0	0	MND
Materials for recycling	kg	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Materials for energy recovery	Kg	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Exported energy	MJ	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Use of renewable material resources	kg	0	0	0	0	0	0	0	MND

MND = Module not declared
Neg. = Negligible

Table 13. *CML Life Cycle Impact Assessment (LCIA) results for the 12mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Global warming (GWP, 100 year)	kg CO_2 eq	8.1	0.17	1.5	0.75	0.16	$1.3x10^{-2}$	1.3	MND
	%	68%	1.5%	13%	6.3%	1.3%	0.11%	11%	
Acidification	kg SO_2 eq	$4.6x10^{-2}$	$6.9x10^{-4}$	$8.0x10^{-3}$	$3.0x10^{-3}$	$5.2x10^{-5}$	$5.3x10^{-5}$	$4.0x10^{-4}$	MND
	%	79%	1.2%	14%	5.1%	0.09%	0.09%	0.70%	
Eutrophication	kg $(PO_4)^{3-}$ eq	$1.3x10^{-2}$	$1.6x10^{-4}$	$2.4x10^{-3}$	$6.7x10^{-4}$	$1.0x10^{-3}$	$1.2x10^{-5}$	$1.3x10^{-2}$	MND
	%	42%	0.51%	8.0%	2.2%	3.3%	0.04%	44%	
Ozone depletion	kg CFC-11 eq.	$4.9x10^{-7}$	$3.2x10^{-8}$	$5.3x10^{-8}$	$1.4x10^{-7}$	$1.0x10^{-9}$	$2.4x10^{-9}$	$9.8x10^{-9}$	MND
	%	67%	4.4%	7.3%	19%	0.14%	0.34%	1.4%	
Smog	kg C_2H_4 eq	$2.2x10^{-3}$	$3.0x10^{-5}$	$3.5x10^{-4}$	$1.3x10^{-4}$	$1.8x10^{-5}$	$2.2x10^{-6}$	$6.8x10^{-5}$	MND
	%	79%	1.1%	13%	4.6%	0.64%	0.08%	2.5%	
Abiotic depletion (elements)	kg Sb eq	$1.8x10^{-5}$	$5.2x10^{-7}$	$1.1x10^{-6}$	$2.2x10^{-6}$	$1.1x10^{-8}$	$3.9x10^{-8}$	$6.6x10^{-8}$	MND
	%	82%	2.3%	4.8%	10.0%	0.05%	0.18%	0.29%	
Abiotic depletion (fossil fuels)	MJ	140	2.8	24	12	0.10	0.21	0.96	MND
	%	77%	1.6%	14%	6.8%	0.06%	0.12%	0.55%	

Table 14. *TRACI Life Cycle Impact Assessment (LCIA) results for the 12mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Global warming (GWP, 100 year)	kg CO_2 eq	7.9	0.17	1.5	0.75	0.14	$1.3x10^{-2}$	1.2	MND
	%	68%	1.5%	13%	6.4%	1.2%	0.11%	10%	
Acidification	kg SO_2 eq	$4.5x10^{-2}$	$8.0x10^{-4}$	$7.7x10^{-3}$	$3.4x10^{-3}$	$6.5x10^{-5}$	$6.1x10^{-5}$	$5.0x10^{-4}$	MND
	%	78%	1.4%	13%	6.0%	0.11%	0.11%	0.87%	
Eutrophication	kg N eq	$2.6x10^{-2}$	$1.9x10^{-4}$	$4.9x10^{-3}$	$8.3x10^{-4}$	$2.6x10^{-3}$	$1.5x10^{-5}$	$3.6x10^{-2}$	MND
	%	36%	0.27%	7.0%	1.2%	3.7%	0.02%	52%	
Ozone depletion	kg CFC-11 eq	$4.9x10^{-7}$	$3.2x10^{-8}$	$5.1x10^{-8}$	$1.4x10^{-7}$	$1.0x10^{-9}$	$2.4x10^{-9}$	$9.8x10^{-9}$	MND
	%	67%	4.5%	7.1%	19%	0.14%	0.34%	1.4%	
Smog	kg O_3 eq	0.49	$1.9x10^{-2}$	$7.5x10^{-2}$	$8.1x10^{-2}$	$1.5x10^{-3}$	$1.4x10^{-3}$	$1.2x10^{-2}$	MND
	%	72%	2.8%	11%	12%	0.23%	0.21%	1.7%	
Fossil fuel depletion	MJ surplus	15	0.38	2.4	1.6	$1.3x10^{-2}$	$2.9x10^{-2}$	0.12	MND
	%	76%	1.9%	12%	8.3%	0.07%	0.15%	0.64%	

MND = Module not declared

Table 15. *Resource use for the 12mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ	7.2	$3.4x10^{-2}$	3.2	0.15	$3.0x10^{-3}$	$2.6x10^{-3}$	$3.3x10^{-2}$	MND
	%	68%	0.32%	30%	1.4%	0.03%	0.02%	0.31%	
Use of renewable primary energy resources used as raw materials	MJ	-	-	-	-	-	-	-	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA	MND
Use of non-renewable primary energy resources used as raw materials	MJ.	INA	INA	INA	INA	INA	INA	INA	MND
Use of secondary materials	kg	0.73	-	-	-	-	-	-	MND
	%	100%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Use of renewable secondary fuels	MJ.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Use of non-renewable secondary fuels	MJ.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND

MND = Module not declared | INA = Indicator not assessed | Neg. = Negligible

Table 16. *Waste and outflows for the 12mm ezoBord panel product over a 75-yr time horizon. All values are rounded to two significant digits. Results reported in MJ are calculated using lower heating values.*

Impact category	Unit	Module A1 - Raw material extraction and processing	Module A2 - Transport to manufacturer	Module A3 - Manufacturing	Module A4 - Transport	Module A5 - Construction - installation	Module C2 - Transport	Module C4 - Disposal	Module D - Reuse, recovery and/or recycling potential
Non-hazardous waste disposed	kg	$3.8x10^{-4}$	$1.6x10^{-6}$	$2.4x10^{-5}$	$6.8x10^{-6}$	$1.1x10^{-7}$	$1.2x10^{-7}$	$6.6x10^{-7}$	MND
	%	$3.8x10^{-4}$	$1.6x10^{-6}$	$2.4x10^{-5}$	$6.8x10^{-6}$	$9.5x10^{-8}$	$1.2x10^{-7}$	$1.2x10^{-6}$	
Hazardous waste disposed	kg	92%	0.38%	5.8%	1.6%	0.02%	0.03%	0.29%	MND
	%	0.67	0.12	$9.1x10^{-2}$	0.53	0.15	$9.4x10^{-3}$	2.9	
Radioactive waste disposed (high-level)	kg	15%	2.8%	2.1%	12%	3.5%	0.21%	64%	MND
	%	$4.3x10^{-5}$	$1.7x10^{-7}$	$6.4x10^{-5}$	$7.1x10^{-7}$	$1.5x10^{-8}$	$1.3x10^{-8}$	$1.1x10^{-7}$	
Radioactive waste disposed (low-level)	kg	40%	0.15%	59%	0.66%	0.01%	0.01%	0.10%	MND
	%	$2.3x10^{-4}$	$1.8x10^{-5}$	$5.2x10^{-5}$	$7.8x10^{-5}$	$5.2x10^{-7}$	$1.4x10^{-6}$	$4.9x10^{-6}$	
Components for re-use	kg	0	0	0	0	0	0	0	MND
Materials for recycling	kg	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Materials for energy recovery	kg	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Recovered energy	MJ eq.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Exported energy	MJ eq.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	MND
Use of renewable material resources	kg	0	0	0	0	0	0	0	MND

MND = Module not declared
Neg. = Negligible

6. LCA: Interpretation

The interpretation phase conforms to ISO 14044 with further guidance from the ILCD General Guide for Life Cycle Assessment. The interpretation included the use of evaluation and sensitivity checks to steer the iterative process during the assessment, and a final evaluation including completeness, sensitivity, and consistency checks, at the end of the study.

The main contributions to indicator results are from the material extraction phase (*A1*). Other life cycle stage results vary across indicators although generally the product manufacturing (*A3*) and upstream transport (*A2*) phases combined are the next highest contributors followed by the product distribution phase (*A4*).

7. Additional Environmental Information

7.1 VOC emissions

Table 17. *VOC emissions test results based on Test Method US EPA 5021A:2003.*

Chemical	CAS NO	Unit	Method Detection Limit	Value
n-Hexane	110-54-3	mg/kg	5	ND
Benzene	71-43-2	mg/kg	5	ND
Styrene	100-42-5	mg/kg	5	ND
Bromoform	75-25-2	µg/g	1	ND

ND = Not Detected (< MDL)

8. References

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