Declaration Owner

3form, LLC.
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Product

- Seeyond
- Clario Cloud
- Hush Blocks
- Hush Clad

This EPD represents delivery of product to North American customers

UNSPSC Code 30161601

Functional Unit

The functional unit is one square foot (0.093 m^2) of ceiling panel installed and maintained over a 75-year period

EPD Number and Period of Validity

SCS-EPD-08684
EPD Valid February 13, 2023 through February 12, 2028

Product Category Rule

PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. September 2018

PCR Guidance for Building-Related Products and Services Part B: Non-Metal Ceiling and Interior Wall Panel System EPD Requirements. Version 2.0. April 2021.

Program Operator

SCS Global Services
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Declaration Owner:	3form, LLC
Address:	2300 South 2300 West, Salt Lake City, UT 84119
Declaration Number:	SCS-EPD-08684
Declaration Validity Period:	EPD Valid February 13, 2023 through February 12, 2028
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, SCS Global Services
LCA Software:	openLCA v1.10.3
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☒ internal ☐ external
LCA Reviewer:	Tess Garvey, Ph.D., 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 3.2. UL Environment. September 2018
Part A 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: Non-Metal Ceiling and Interior Wall Panel System EPD Requirements. Version 2.0. April 2021
Part B PCR Review conducted by:	Jack Geibig (Chair); Tom Gloria, PhD; and Thaddeus Owen
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
Declaration Contents:	

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.

1. 3form

3form is a leading manufacturer of award-winning building materials and architectural hardware solutions for the Architecture + Design industry. A culture of responsibility at 3form ensures that human health and environmental sustainability are considered in our product designs and manufacturing practices. Utilizing four world-class factories located in the United States, 3form creates high performance translucent resin and glass panels, lighting and acoustic solutions, and other inspired products for indoor and outdoor applications.

2. Product

2.1 PRODUCT DESCRIPTION

The 3form acoustic ceiling panel products (UNSPSC Code 30161601) are manufactured at production facilities in Salt Lake City, UT. The primary materials include a PET felt, containing 50% post-consumer recycled content, and various steel, plastic and wood mounting components. Table 1 summarizes the products included in the EPD.

Table 1. *3form acoustic ceiling panel products included in the LCA scope.*

Product Line	Description
Seeyond	Create a private space, contain sound, and build a more comfortable environment with this absorptive, modular tile system. Seeyond is a series of lightweight dimensional tiles made from Acoustic Felt and boasts an NRC rating of 1.10. When combined with Acoustic Foam, Seeyond has an NRC of 1.10. Use Seeyond to build walls, divide a space, or create unique features that will leave a lasting impression
Clario Cloud	Clario is a PET felt ceiling system that adds textures, color and acoustic performance to your space. The system is made from 8 or 16 individual fins that are assembled to create a beautiful aesthetic. Available in a variety of Sola Felt colors.
Hush Blocks	Create a private space, contain sound, and build a more comfortable environment with this absorptive, modular tile system. Hush Blocks is a series of lightweight 24"x24" tiles made from Sola Felt and boasts an NRC rating of .80. Use Hush Blocks to create unique features that will leave a lasting impression
Hush Clad	Modular Sola Felt Panels with Sound Absorbing Capabilities and loads of versatility to help you create something inspiring. 3form Sola Felt is made using our PET technology and 50% post-consumer recycled PET. Sola Felt is designed to be attractive, environmentally sound, and embedded with acoustic properties. Hush Clad Panels can be specified in a variety of color options.

2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.

2.3 APPLICATION

The 3form ceiling panel products provide the primary function of sound attenuation and décor for interior applications.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

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.

Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

Table 2. *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

X = Module Included | MND = Module Not Declared

2.5 TECHNICAL DATA

Technical specifications of the products are summarized in Table 3. Additional product performance specifications can be found on the manufacturer's website www.3-form.com.

Table 3. *Product performance test results for the 3form acoustic ceiling panel products.*

Test	Seeyond	Clario	Hush Blocks	Hush Clad
ASTM[1] C423 - Sound Absorption Characteristics				
Noise Reduction Coefficient (NCR)	1.1	0.70	0.8	0.35
ASTM E84 - Surface Burning Characteristics				
Flame spread	10; Class A	0; Class A	10; Class A	50; Class B
Smoke developed	105	70	105	300

[1]ASTM International. https://www.astm.org/

2.6 MARKET PLACEMENT/APPLICATION RULES

The 3form ceiling panel products are intended to provide sound attenuation and décor for interior applications and are available in a variety of colors and offered in various sizes. All dimensions and squareness are subject to a 2% tolerance. The products have been independently tested and meet the criteria for approved interior finishes as described in the 2015 International Building Code®.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The 3form acoustic ceiling panel products are delivered in the form of panels ready for installation.

2.8 MATERIAL COMPOSITION

The primary component materials include polyester felt and various mounting hardware.

Table 4. *Product material composition per 1 ft² of ceiling panel product.*

Product	Felt	Wood	Hardware	Total
Seeyond	0.487 (43%)	0.594 (52%)	$6.08x10^{-2}$ (5.3%)	1.14 (100%)
Clario	0.174 (100%)	0.00 (0%)	0.00 (0%)	0.174 (100%)
Hush Blocks	0.326 (45%)	0.220 (30%)	0.180 (25%)	0.726 (100%)
Hush Clad	0.174 (100%)	0.00 (0%)	0.00 (0%)	0.174 (100%)

2.9 MANUFACTURING

The 3form acoustic ceiling panel products (UNSPSC Code 30161601) are manufactured at production facilities in Salt Lake City, UT. The primary materials include a PET felt, containing 50% post-consumer recycled content, and various steel, plastic and wood mounting components.

2.10 PACKAGING

The 3form products are packaged for shipment using paper corrugated board and wood pallets.

Table 5. *Packaging composition per 1 ft² of ceiling panel product.*

Product	Seeyond	Clario	Hush Blocks	Hush Clad
Pallet	$5.48x10^{-2}$ (74%)	$4.06x10^{-3}$ (6.7%)	0.104 (100%)	$3.37x10^{-2}$ (100%)
Cardboard/Paper	$1.88x10^{-2}$ (26%)	$5.65x10^{-2}$ (93%)	0.00 (0%)	0.00 (0%)
Total	**$7.36x10^{-2}$ (100%)**	**$6.05x10^{-2}$ (100%)**	**0.104 (100%)**	**$3.37x10^{-2}$ (100%)**

2.11 PRODUCT INSTALLATION

Installation of the ceiling panel products is accomplished manually using hand tools with no associated impacts. The products are manufacturing and delivered ready for installation with no scrap generated. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

2.12 USE CONDITIONS

No special conditions of use are noted.

2.13 REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of the acoustic ceiling panel products is 30 years.

2.14 RE-USE PHASE

The ceiling products are not typically reused at end-of-life.

2.15 DISPOSAL

Assumptions for the product and packaging end-of-life are based on regional statistics regarding municipal solid waste generation and disposal, including end-of-life recycling rates of packaging materials. Material recycling rates are based on the US EPA's disposal statistics for municipal solid waste (MSW) for 2018. For disposal of materials which are not recycled, it is assumed that 20% are incinerated and 80% go to a landfill. Transportation of waste materials at end of life assumes a 35 km average distance to disposal, consistent with PCR guidance.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturers' website at www.3-form.com

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit used in the study is defined as 1 ft^2 (0.093 m^2) of ceiling panel installed for use over a 75-year period. Following PCR guidance, the reference service lifetime of the products is assumed to be 30 years. There are no impacts from the use and maintenance of the products. A total of 1.5 product replacements are required over the building service lifetime. The reference flows and functional unit for the product system are summarized below.

Table 6. *Functional unit and reference flow for the ceiling panel products.*

Product Line	Functional Unit	Reference flow (kg)	Nominal Thickness (cm)	Surface weight (kg/ft^2)	Reference Service Life – RSL (years)	# of Product replacements (Replacement cycle)
Seeyond	0.093 m^2 (1 ft^2) installed product for 75 years	1.14	6.4 (1/4")	1.14	30	1.5
Clario	0.093 m^2 (1 ft^2) installed product for 75 years	0.174	4.8 (3/16")	0.174	30	1.5
Hush Blocks	0.093 m^2 (1 ft^2) installed product for 75 years	0.726	6.4 (1/4")	0.726	30	1.5
Hush Clad	0.093 m^2 (1 ft^2) installed product for 75 years	0.174	9.5 (3/8")	0.174	30	1.5

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 EPD scope are described in Table 7 and illustrated in Figure 1.

Table 7. *The modules and unit processes included in the scope for the ceiling panel products.*

Module	Module description from the PCR	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels	Extraction and processing of raw materials for the product components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facilities
A3	Manufacturing, including ancillary material production	Manufacturing of the ceiling panel products and packaging (incl. upstream unit processes)
A4	Transport (to the building site)	Transport of product (including packaging) to the building site
A5	Construction-installation process	The product is installed manually with no associated impacts. Only impacts from packaging disposal are included in this phase.
B1	Product use	There are no impacts associated with the use of the products
B2	Product maintenance	There are no impacts associated with the maintenance of the products over the 75-year ESL.
B3	Product repair	The ceiling panels are not expected to require repair over its lifetime.
B4	Product replacement	The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this phase
B5	Product refurbishment	The ceiling panels are not expected to require refurbishment over its lifetime.
B6	Operational energy use by technical building systems	There is no operational energy use associated with the use of the product
B7	Operational water use by technical building systems	There is no operational water use associated with the use of the product
C1	Deconstruction, demolition	Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts
C2	Transport (to waste processing)	Transport of product to waste treatment at end-of-life
C3	Waste processing for reuse, recovery and/or recycling	The product is disposed of by landfilling which requires no waste processing
C4	Disposal	Disposal of flooring product in municipal landfill or incineration
D	Reuse-recovery-recycling potential	Module Not Declared

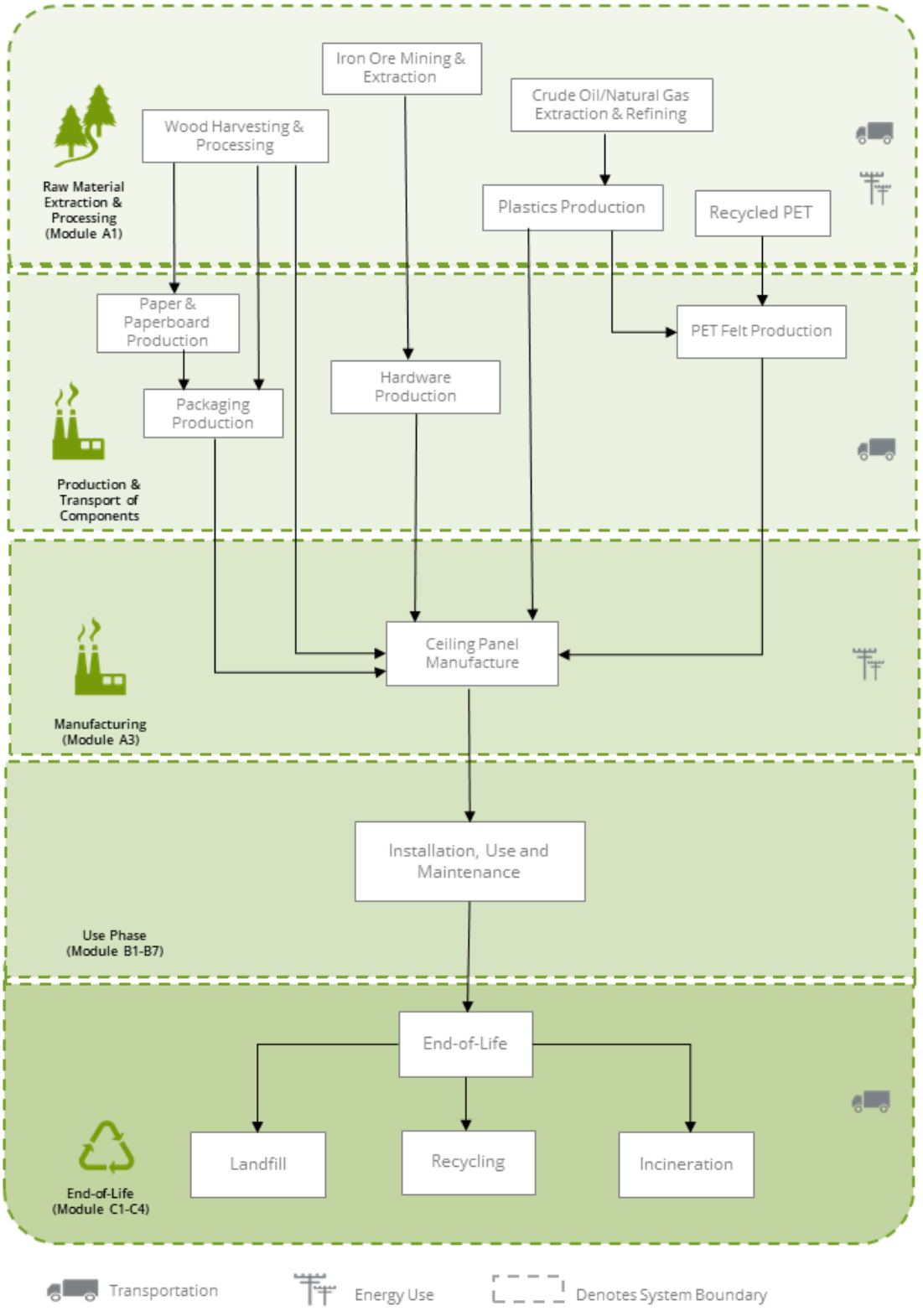

Figure 1. *Flow Diagram for the life cycle of the 3form acoustic ceiling panel product system.*

3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

According to the PCR, there are no impacts associated with the use phase of the products.

3.4 UNITS

All data and results are presented using SI units.

3.5 ESTIMATES AND ASSUMPTIONS

- The manufacturing facility in Salt Lake City is located within the NWPP eGRID EPA NERC subregions. Ecoinvent inventory datasets representing the NWPP eGRID electricity grid are used to estimate resource use and emissions from electricity use at the production facilities.
- Electricity and resource use at the manufacturing facility were allocated to the products based on product mass and annual production.
- Primary data for the fabrication of the PET felt were provided by the supplier, based on annual production, and used to develop the necessary inventory data for the product system modeling.
- Although some suppliers provided material data for various components of the products, much of the upstream raw materials extraction and processing could not be modeled with actual process information. Representative data from the Ecoinvent LCI database were utilized as appropriate.
- Disposal of product and packaging materials is modeled based on 2018 statistics for municipal solid waste generation and disposal in the United States, from the US Environmental Protection Agency. This data supplies recycling rates for durable goods, as well as for packaging and containers.
- For final disposal of the product and packaging materials at end-of-life, all materials are assumed to be transported 35 km 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.
- Modeling of recycled materials follows the recycled content method (also known as 100-0 method or cut-off method) whereby only the burdens of reprocessing the waste material are allocated to the system from the use of the recycled material.

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 requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.6 CUT-OFF RULES

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.

3.7 DATA SOURCES

Primary data were provided by 3form for their manufacturing facilities. The sources of secondary LCI data are the Ecoinvent database.

Table 8. *Data sources for the 3form product system.*

Material	Material Dataset	Data Source	Publication Date
PRODUCT MATREIALS			
Sola PET felt	polyethylene terephthalate, granulate, bottle grade, recycled to generic market for bottle grade PET granulate | polyethylene terephthalate, granulate, bottle grade | Cutoff, S/RoW polyethylene terephthalate production, granulate, amorphous | polyethylene terephthalate, granulate, amorphous | Cutoff, S/RoW; market group for electricity, medium voltage | electricity, medium voltage | Cutoff, S/CN;	Primary data; EI v3.8	2021
Wood (MDF)	medium density fibreboard production, uncoated | medium density fibreboard | Cutoff, S/RoW	EI v3.8	2021
Mounting Hardware	steel production, converter, low-alloyed | steel, low-alloyed | Cutoff, S/RoW	EI v3.8	2021
	brass production | brass | Cutoff, S/RoW	EI v3.8	2021
	permanent magnet production, for electric motor | permanent magnet, for electric motor | Cutoff, S/GLO	EI v3.8	2021
	nylon 6-6 production | nylon 6-6 | Cutoff, S/RoW	EI v3.8	2021
PACKAGING MATERIALS			
Corrugated board	containerboard production, linerboard, testliner | containerboard, linerboard | Cutoff, S/RoW	EI v3.8	2021
Paper	market for printed paper, offset | printed paper, offset | Cutoff, S/GLO	EI v3.8	2021
Pallet	EUR-flat pallet production | EUR-flat pallet | Cutoff, S/RoW	EI v3.8	2021
TRANSPORT			
Truck	transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, S/RoW	EI v3.8	2021
Ship	transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, S/GLO	EI v3.8	2021
RESOURCES			
Grid electricity - SLC	Electricity, medium voltage, per kWh – NWPP/NWPP	eGRID 2018; EI v3.8	2018; 2021
Grid electricity - Detroit	Electricity, medium voltage, per kWh – RFCM/RFCM	eGRID 2018; EI v3.8	2018; 2021
Natural gas	heat production, natural gas, at boiler modulating >100kW | heat, district or industrial, natural gas | Cutoff, S/RoW	EI v3.8	2021
Propane	propane, burned in building machine | propane, burned in building machine | Cutoff, S/GLO	EI v3.8	2021

3.8 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 9. *Data quality assessment for the 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 5 years old (typically 2016). 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 annualized production for 2021.
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. Electricity use for product manufacture is modeled using representative data for the EPA NERC sub-regions. Surrogate data used in the assessment are representative of global or North American operations. Data representative of global 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 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.
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 v3.8 data where available. Different portions of the product life cycle are equally considered.
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 3form's 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. For secondary LCI data, Ecoinvent v3.8 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for all upstream operations were not available 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.

3.9 PERIOD UNDER REVIEW

The period of review is calendar year 2021.

3.10 ALLOCATION

Manufacturing resource use was allocated to the products based on product mass as a fraction of total facility production. Impacts from transportation were allocated based on the mass of material and distance transported.

3.11 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 products to the point of installation is included in the assessment. Transportation parameters for modeling transport to product distribution centers are based on PCR guidance and summarized in Table10.

Table 10. *Transport parameters, per reference flow.*

Parameter	Value
Diesel truck – Fuel utilization (L/100 km)	18.7
Diesel truck – Capacity utilization (%)	76%
Diesel truck – Distance (km)	800
Gross mass of products transported (kg) – Seeyond	1.22
Gross mass of products transported (kg) – Clario	0.235
Gross mass of products transported (kg) – Hush Blocks	0.830
Gross mass of products transported (kg) – Hush Clad	0.208

The products are installed manually with negligible waste. As per PCR guidance, no impacts are associated with the use and maintenance of the products. Additionally, a 30-year reference service lifetime is assumed for the products requiring 1.5 product replacements to fulfill the functional unit for the product system.

The impacts associated with packaging disposal are included with the installation phase, as per PCR requirements. Recycling rates for packaging are used to estimate packaging weights disposed. A summary of waste disposed and biogenic carbon uptake and emissions for product packaging is provided in Table 11.

Table 11. *Installation parameters for the 3form ceiling panel products, per 1 ft^2.*

Parameter			Value
Ancillary materials - Adhesive (kg)			-
Net freshwater consumption (m^3)			-
Electricity consumption (kWh)			-
Product loss per functional unit (kg)			negligible
Waste materials generated by product installation (kg)			negligible
Output materials resulting from on-site waste processing (kg)			na
Direct emissions (kg)			-
Product	Mass of packaging waste (kg)		Biogenic carbon in packaging (kg CO_2)
	Corrugated/ Paper	Wood	
Seeyond	$1.88x10^{-2}$	$5.48x10^{-2}$	0.130
Clario	$5.65x10^{-2}$	$4.06x10^{-3}$	0.107
Hush Blocks	0.00	0.104	0.183
Hush Clad	0.00	$3.37x10^{-2}$	$5.94x10^{-2}$

Use and Maintenance stage (B1-B2)

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

Repair/Refurbishment stage (B3; B5)

Product repair and refurbishment are not relevant during the lifetime of the product.

Replacement stage (B4)

The materials and energy required for replacement of the product over the 75-year estimated service lifetime of the assessment are included in this stage. Modeling parameters for the product replacement stage are summarized in Table 12.

Table 12. *Product replacement parameters for the flooring products, per 1 m^2.*

Parameter	Units	Seeyond	Clario	Hush Blocks	Hush Clad
Reference service life	Years	30	30	30	30
Replacement cycle	-	1.5	1.5	1.5	1.5
Ancillary materials	kg	-	-	-	-
Replacement parts	kg	3.05	0.588	2.08	0.520
Direct emissions		-			

Disposal stage (C1 - C4)

The disposal stage includes demolition of the products (*C1*); transport of the 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 ceiling panel products, no emissions are generated during demolition (*C1*) while no waste processing (*C3*) is required for incineration or landfill disposal.

Material recycling rates are based on the US EPA's disposal statistics for municipal solid waste (MSW) for 2018. Transportation of waste materials at end-of-life (*C2*) assumes a 35 km (~22 mile) average distance to disposal, consistent with PCR guidance. For disposal of product materials which are not recycled, it is assumed that 20% are incinerated and 80% go to a landfill.

The relevant disposal statistics used for the packaging are summarized in Table 13.

Table 13. *Recycling rates for product and packaging materials at end-of-life.*

Material	Product Recycling rate (%)	Packaging Recycling rate (%)
Recycling Rates		
Textile	13.7%	n/a
Steel	27.8%	n/a
Plastic	6.6%	15%
Paper & Pulp	n/a	75%
Wood	-	-
Disposal of Non-recyclables		
Landfill	80%	80%
Incineration	20%	20%

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.

The following environmental impact category indicators 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 2.1:

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

The 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

The following key life cycle inventory data parameters are taken from the PCR, which include resource use, output flows, and waste categories.

Key Life Cycle Inventory Parameter	Acronym	Reporting Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	RPR_E	MJ, LHV
Use of renewable primary energy resources used as raw materials	RPR_M	MJ, LHV
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	$NRPR_E$	MJ, LHV
Use of non-renewable primary energy resources used as raw materials	$NRPR_M$	MJ, LHV
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ, LHV
Use of non-renewable secondary fuels	NRSF	MJ, LHV
Use of net fresh water	FW	m^3
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
High-level radioactive waste disposed	HLRW	kg
Intermediate- and low-level radioactive waste disposed	ILLRW	kg
Components for re-use	CRU	kg
Materials for recycling	MR	kg
Materials for energy recovery	MER	kg
Exported energy	EE	MJ, LHV
BCEPD: Emissions and removals of biogenic carbon of product	BCEPD	kg CO_2 eq
BCEPK: Emissions and removals of biogenic carbon of packaging	BCEPK	kg CO_2 eq
BCECC: Carbon emissions from calcination and carbonation	BCECC	kg CO_2 eq
BCERSF: Carbon emissions from renewable waste combustion	BCESF	kg CO_2 eq
BCENSF: Carbon emissions from non-renewable waste combustion	BCENSF	kg CO_2 eq

Modules B1-B3 and B5-B7 are not associated with any impact and are therefore declared as zero. In addition, module C1 and C3 are likewise not associated with any impact as the products are expected to be manually deconstructed. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

Table 14. *Life Cycle Impact Assessment (LCIA) results for the **Seeyond** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B4	C2	C4
TRACI 2.1								
GWP (kg CO2 eq)	4.61	0.299	0.174	0.165	$1.08x10^{-2}$	8.40	$5.06x10^{-2}$	0.294
	33%	2.1%	1.2%	1.2%	0.08%	60%	0.36%	2.1%
AP (kg SO2 eq)	$2.22x10^{-2}$	$3.61x10^{-3}$	$2.45x10^{-4}$	$7.54x10^{-4}$	$2.53x10^{-5}$	$4.12x10^{-2}$	$2.92x10^{-4}$	$3.39x10^{-4}$
	32%	5.3%	0.36%	1.1%	0.04%	60%	0.42%	0.49%
EP (kg N eq)	$5.16x10^{-2}$	$3.63x10^{-4}$	$2.04x10^{-3}$	$1.81x10^{-4}$	$3.50x10^{-4}$	$9.12x10^{-2}$	$3.71x10^{-5}$	$6.19x10^{-3}$
	34%	0.24%	1.3%	0.12%	0.23%	60%	0.02%	4.1%
SFP (kg O3 eq)	0.291	$7.17x10^{-2}$	$4.26x10^{-3}$	$1.81x10^{-2}$	$6.88x10^{-4}$	0.605	$8.27x10^{-3}$	$9.19x10^{-3}$
	29%	7.1%	0.42%	1.8%	0.07%	60%	0.82%	0.91%
ODP (kg CFC-11 eq)	$4.21x10^{-6}$	$6.74x10^{-8}$	$4.37x10^{-9}$	$3.84x10^{-8}$	$9.31x10^{-10}$	$6.51x10^{-6}$	$1.17x10^{-8}$	$4.48x10^{-9}$
	39%	0.62%	0.04%	0.35%	0.01%	60%	0.11%	0.04%
FFD (MJ eq)	6.63	0.613	$5.81x10^{-2}$	0.351	$8.61x10^{-3}$	11.7	0.104	$5.25x10^{-2}$
	34%	3.1%	0.30%	1.8%	0.04%	60%	0.53%	0.27%
CML-IA								
GWP (kg CO2 eq)	4.65	0.300	0.208	0.166	$1.25x10^{-2}$	8.60	$5.06x10^{-2}$	0.343
	32%	2.1%	1.5%	1.2%	0.09%	60%	0.35%	2.4%
AP (kg SO2 eq)	$2.16x10^{-2}$	$3.32x10^{-3}$	$2.11x10^{-4}$	$6.45x10^{-4}$	$2.05x10^{-5}$	$3.94x10^{-2}$	$2.36x10^{-4}$	$2.66x10^{-4}$
	33%	5.1%	0.32%	0.98%	0.03%	60%	0.36%	0.40%
EP (kg (PO4)3- eq)	$2.32x10^{-2}$	$4.64x10^{-4}$	$7.92x10^{-4}$	$1.49x10^{-4}$	$1.29x10^{-4}$	$4.07x10^{-2}$	$5.05x10^{-5}$	$2.34x10^{-3}$
	34%	0.68%	1.2%	0.22%	0.19%	60%	0.07%	3.4%
POCP (kg C2H4 eq)	$1.36x10^{-3}$	$9.21x10^{-5}$	$5.22x10^{-5}$	$2.20x10^{-5}$	$2.53x10^{-6}$	$2.40x10^{-3}$	$7.78x10^{-6}$	$6.14x10^{-5}$
	34%	2.3%	1.3%	0.55%	0.06%	60%	0.19%	1.5%
ODP (kg CFC-11 eq)	$3.16x10^{-6}$	$5.06x10^{-8}$	$3.34x10^{-9}$	$2.88x10^{-8}$	$7.00x10^{-10}$	$4.88x10^{-6}$	$8.76x10^{-9}$	$3.51x10^{-9}$
	39%	0.62%	0.04%	0.35%	0.01%	60%	0.11%	0.04%
ADPE (kg Sb eq)	$6.94x10^{-5}$	$8.38x10^{-7}$	$2.49x10^{-7}$	$5.75x10^{-7}$	$5.21x10^{-9}$	$1.07x10^{-4}$	$4.45x10^{-8}$	$8.07x10^{-8}$
	39%	0.47%	0.14%	0.32%	0.00%	60%	0.03%	0.05%
ADPF (MJ eq)	61.6	4.24	0.520	2.46	$5.83x10^{-2}$	105	0.693	0.386
	35%	2.4%	0.30%	1.4%	0.03%	60%	0.40%	0.22%

Table 15. *Resource use and waste flows for the **Seeyond** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
Resources								
RPR_E (MJ)	13.7	$4.25x10^{-2}$	1.85	$2.80x10^{-2}$	$4.84x10^{-4}$	23.4	$2.65x10^{-3}$	$1.05x10^{-2}$
	35%	0.11%	4.7%	0.07%	0.00%	60%	0.01%	0.03%
RPR_M (MJ)	11.3	0.00	0.00	0.00	0.00	16.9	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
$NRPR_E$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
$NRPR_M$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
SM (kg)	0.244	0.00	0.00	0.00	0.00	0.365	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
RSF/NRSF (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
RE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
FW (m^3)	0.263	$2.55x10^{-3}$	$2.66x10^{-3}$	$1.72x10^{-3}$	$3.87x10^{-5}$	0.407	$2.19x10^{-4}$	$1.13x10^{-3}$
	39%	0.38%	0.39%	0.25%	0.01%	60%	0.03%	0.17%
Wastes								
HWD (kg)	$2.34x10^{-4}$	$9.20x10^{-6}$	$9.86x10^{-7}$	$6.57x10^{-6}$	$1.44x10^{-7}$	$3.81x10^{-4}$	$1.89x10^{-6}$	$8.37x10^{-7}$
	37%	1.4%	0.16%	1.0%	0.02%	60%	0.30%	0.13%
NHWD (kg)	0.572	0.158	0.286	0.126	$4.81x10^{-2}$	3.09	$3.53x10^{-3}$	0.866
	11%	3.1%	5.5%	2.5%	0.93%	60%	0.07%	17%
HLRW (kg)	$1.76x10^{-5}$	$1.84x10^{-7}$	$1.37x10^{-7}$	$1.26x10^{-7}$	$2.24x10^{-9}$	$2.72x10^{-5}$	$1.10x10^{-8}$	$5.24x10^{-8}$
	39%	0.41%	0.30%	0.28%	0.00%	60%	0.02%	0.12%
ILLRW (kg)	$1.34x10^{-3}$	$2.84x10^{-5}$	$1.64x10^{-6}$	$1.61x10^{-5}$	$3.90x10^{-7}$	$2.09x10^{-3}$	$4.90x10^{-6}$	$1.47x10^{-6}$
	38%	0.82%	0.05%	0.46%	0.01%	60%	0.14%	0.04%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	$1.41x10^{-2}$	0.125	0.00	$6.93x10^{-2}$
	0.00%	0.00%	0.00%	0.00%	6.8%	60%	0.00%	33%
MER (kg)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
EE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

INA = Indicator not assessed | Neg. = Negligible

Table 16. *Carbon flows for the **Seeyond** acoustic ceiling panel products over a 75-yr time horizon. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
BCEPD (kg CO_2 eq)	0.981	0.00	0.00	0.00	0.00	1.53	0.00	$3.75x10^{-2}$
	39%	0%	0%	0%	0%	60%	0%	1%
BCEPK (kg CO_2 eq)	0.00	0.00	0.135	0.00	$9.26x10^{-3}$	0.216	0.00	0.00
	0%	0%	37%	0%	3%	60%	0%	0%
BCECC (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCERSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCENRSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 17. *Life Cycle Impact Assessment (LCIA) results for the **Clario** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B4	C2	C4
TRACI 2.1								
GWP (kg CO2 eq)	0.652	$8.50x10^{-2}$	$4.28x10^{-2}$	$3.19x10^{-2}$	$1.68x10^{-2}$	1.38	$7.71x10^{-3}$	$8.43x10^{-2}$
	28%	3.7%	1.9%	1.4%	0.73%	60%	0.34%	3.7%
AP (kg SO2 eq)	$2.77x10^{-3}$	$1.08x10^{-3}$	$2.29x10^{-4}$	$1.46x10^{-4}$	$1.98x10^{-5}$	$6.57x10^{-3}$	$4.44x10^{-5}$	$9.73x10^{-5}$
	25%	9.9%	2.1%	1.3%	0.18%	60%	0.41%	0.89%
EP (kg N eq)	$1.59x10^{-3}$	$1.04x10^{-4}$	$2.85x10^{-4}$	$3.49x10^{-5}$	$1.08x10^{-4}$	$4.47x10^{-3}$	$5.66x10^{-6}$	$8.56x10^{-4}$
	21%	1.4%	3.8%	0.47%	1.4%	60%	0.08%	11%
SFP (kg O3 eq)	$3.73x10^{-2}$	$2.13x10^{-2}$	$3.96x10^{-3}$	$3.49x10^{-3}$	$5.01x10^{-4}$	0.106	$1.26x10^{-3}$	$2.68x10^{-3}$
	21%	12%	2.2%	2.0%	0.28%	60%	0.71%	1.5%
ODP (kg CFC-11 eq)	$1.23x10^{-6}$	$1.91x10^{-8}$	$3.14x10^{-9}$	$7.40x10^{-9}$	$6.81x10^{-10}$	$1.89x10^{-6}$	$1.78x10^{-9}$	$9.01x10^{-10}$
	39%	0.60%	0.10%	0.23%	0.02%	60%	0.06%	0.03%
FFD (MJ eq)	1.15	0.174	$4.54x10^{-2}$	$6.76x10^{-2}$	$6.20x10^{-3}$	2.21	$1.59x10^{-2}$	$1.14x10^{-2}$
	31%	4.7%	1.2%	1.8%	0.17%	60%	0.43%	0.31%
CML-IA								
GWP (kg CO2 eq)	0.664	$8.51x10^{-2}$	$4.36x10^{-2}$	$3.20x10^{-2}$	$2.04x10^{-2}$	1.43	$7.71x10^{-3}$	$9.78x10^{-2}$
	28%	3.6%	1.8%	1.3%	0.86%	60%	0.32%	4.1%
AP (kg SO2 eq)	$2.67x10^{-3}$	$9.96x10^{-4}$	$1.87x10^{-4}$	$1.24x10^{-4}$	$1.58x10^{-5}$	$6.15x10^{-3}$	$3.60x10^{-5}$	$7.54x10^{-5}$
	26%	9.7%	1.8%	1.2%	0.15%	60%	0.35%	0.74%
EP (kg (PO4)3- eq)	$8.21x10^{-4}$	$1.37x10^{-4}$	$1.38x10^{-4}$	$2.88x10^{-5}$	$4.21x10^{-5}$	$2.28x10^{-3}$	$7.70x10^{-6}$	$3.43x10^{-4}$
	22%	3.6%	3.6%	0.76%	1.1%	60%	0.20%	9.0%
POCP (kg C2H4 eq)	$1.43x10^{-4}$	$2.74x10^{-5}$	$1.54x10^{-5}$	$4.25x10^{-6}$	$4.25x10^{-6}$	$3.19x10^{-4}$	$1.19x10^{-6}$	$1.70x10^{-5}$
	27%	5.2%	2.9%	0.80%	0.80%	60%	0.22%	3.2%
ODP (kg CFC-11 eq)	$9.17x10^{-7}$	$1.43x10^{-8}$	$2.41x10^{-9}$	$5.56x10^{-9}$	$5.12x10^{-10}$	$1.41x10^{-6}$	$1.34x10^{-9}$	$7.27x10^{-10}$
	39%	0.61%	0.10%	0.24%	0.02%	60%	0.06%	0.03%
ADPE (kg Sb eq)	$4.27x10^{-6}$	$2.33x10^{-7}$	$2.50x10^{-7}$	$1.11x10^{-7}$	$3.62x10^{-9}$	$7.34x10^{-6}$	$6.79x10^{-9}$	$1.97x10^{-8}$
	35%	1.9%	2.0%	0.91%	0.03%	60%	0.06%	0.16%
ADPF (MJ eq)	10.0	1.20	0.468	0.474	$4.21x10^{-2}$	18.6	0.106	$8.46x10^{-2}$
	32%	3.9%	1.5%	1.5%	0.14%	60%	0.34%	0.27%

Table 18. *Resource use and waste flows for the **Clario** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
Resources								
RPR_E (MJ)	0.545	$1.19x10^{-2}$	1.26	$5.41x10^{-3}$	$4.04x10^{-4}$	2.74	$4.03x10^{-4}$	$2.60x10^{-3}$
	12%	0.26%	28%	0.12%	0.01%	60%	0.01%	0.06%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$NRPR_E$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
$NRPR_M$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
SM (kg)	$8.70x10^{-2}$	0.00	0.00	0.00	0.00	0.131	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
RSF/NRSF (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
RE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
FW (m^3)	$2.56x10^{-2}$	$7.11x10^{-4}$	$3.97x10^{-3}$	$3.31x10^{-4}$	$3.09x10^{-5}$	$4.65x10^{-2}$	$3.34x10^{-5}$	$3.09x10^{-4}$
	33%	0.92%	5.1%	0.43%	0.04%	60%	0.04%	0.40%
Wastes								
HWD (kg)	$1.42x10^{-5}$	$2.55x10^{-6}$	$5.26x10^{-7}$	$1.27x10^{-6}$	$1.08x10^{-7}$	$2.86x10^{-5}$	$2.88x10^{-7}$	$1.99x10^{-7}$
	30%	5.3%	1.1%	2.7%	0.23%	60%	0.60%	0.42%
NHWD (kg)	$8.46x10^{-2}$	$4.31x10^{-2}$	$7.47x10^{-3}$	$2.44x10^{-2}$	$1.48x10^{-2}$	0.445	$5.38x10^{-4}$	0.122
	11%	5.8%	1.0%	3.3%	2.0%	60%	0.07%	16%
HLRW (kg)	$1.97x10^{-6}$	$5.14x10^{-8}$	$1.74x10^{-7}$	$2.43x10^{-8}$	$1.95x10^{-9}$	$3.35x10^{-6}$	$1.67x10^{-9}$	$1.31x10^{-8}$
	35%	0.92%	3.1%	0.43%	0.03%	60%	0.03%	0.23%
ILLRW (kg)	$1.37x10^{-5}$	$8.04x10^{-6}$	$1.13x10^{-6}$	$3.11x10^{-6}$	$2.86x10^{-7}$	$4.09x10^{-5}$	$7.47x10^{-7}$	$2.36x10^{-7}$
	20%	12%	1.7%	4.6%	0.42%	60%	1.1%	0.35%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	$4.24x10^{-2}$	$9.93x10^{-2}$	0.00	$2.38x10^{-2}$
	0.00%	0.00%	0.00%	0.00%	26%	60%	0.00%	14%
MER (kg)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
EE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

INA = Indicator not assessed | Neg. = Negligible

Table 19. *Carbon flows for the **Clario** acoustic ceiling panel products over a 75-yr time horizon. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
BCEPD (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%
BCEPK (kg CO_2 eq)	0.00	0.00	0.111	0.00	$1.77x10^{-2}$	0.193	0.00	0.00
	0%	0%	34%	0%	6%	60%	0%	0%
BCECC (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCERSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCENRSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 20. *Life Cycle Impact Assessment (LCIA) results for the **Hush Blocks** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B4	C2	C4
TRACI 2.1								
GWP (kg CO2 eq)	3.49	0.321	0.268	0.113	$1.01x10^{-2}$	6.61	$3.22x10^{-2}$	0.170
	32%	2.9%	2.4%	1.0%	0.09%	60%	0.29%	1.5%
AP (kg SO2 eq)	$1.48x10^{-2}$	$3.95x10^{-3}$	$3.11x10^{-4}$	$5.15x10^{-4}$	$3.65x10^{-5}$	$3.01x10^{-2}$	$1.85x10^{-4}$	$2.09x10^{-4}$
	30%	7.9%	0.62%	1.0%	0.07%	60%	0.37%	0.42%
EP (kg N eq)	$9.71x10^{-3}$	$3.91x10^{-4}$	$3.21x10^{-3}$	$1.23x10^{-4}$	$6.13x10^{-4}$	$2.55x10^{-2}$	$2.36x10^{-5}$	$2.89x10^{-3}$
	23%	0.92%	7.6%	0.29%	1.4%	60%	0.06%	6.8%
SFP (kg O3 eq)	0.205	$7.83x10^{-2}$	$5.49x10^{-3}$	$1.24x10^{-2}$	$1.01x10^{-3}$	0.470	$5.25x10^{-3}$	$5.71x10^{-3}$
	26%	10.0%	0.70%	1.6%	0.13%	60%	0.67%	0.73%
ODP (kg CFC-11 eq)	$4.50x10^{-6}$	$7.21x10^{-8}$	$6.15x10^{-9}$	$2.62x10^{-8}$	$1.37x10^{-9}$	$6.93x10^{-6}$	$7.42x10^{-9}$	$2.63x10^{-9}$
	39%	0.62%	0.05%	0.23%	0.01%	60%	0.06%	0.02%
FFD (MJ eq)	5.34	0.656	$8.00x10^{-2}$	0.239	$1.27x10^{-2}$	9.63	$6.64x10^{-2}$	$3.10x10^{-2}$
	33%	4.1%	0.50%	1.5%	0.08%	60%	0.41%	0.19%
CML-IA								
GWP (kg CO2 eq)	3.55	0.321	0.323	0.113	$1.12x10^{-2}$	6.82	$3.22x10^{-2}$	0.198
	31%	2.8%	2.8%	1.00%	0.10%	60%	0.28%	1.7%
AP (kg SO2 eq)	$1.42x10^{-2}$	$3.64x10^{-3}$	$2.76x10^{-4}$	$4.40x10^{-4}$	$2.97x10^{-5}$	$2.84x10^{-2}$	$1.50x10^{-4}$	$1.64x10^{-4}$
	30%	7.7%	0.58%	0.93%	0.06%	60%	0.32%	0.35%
EP (kg (PO4)3- eq)	$4.98x10^{-3}$	$5.05x10^{-4}$	$1.24x10^{-3}$	$1.02x10^{-4}$	$2.25x10^{-4}$	$1.23x10^{-2}$	$3.21x10^{-5}$	$1.11x10^{-3}$
	24%	2.5%	6.0%	0.50%	1.1%	60%	0.16%	5.4%
POCP (kg C2H4 eq)	$9.73x10^{-4}$	$1.01x10^{-4}$	$8.01x10^{-5}$	$1.50x10^{-5}$	$2.18x10^{-6}$	$1.82x10^{-3}$	$4.95x10^{-6}$	$3.52x10^{-5}$
	32%	3.3%	2.6%	0.50%	0.07%	60%	0.16%	1.2%
ODP (kg CFC-11 eq)	$3.36x10^{-6}$	$5.42x10^{-8}$	$4.71x10^{-9}$	$1.97x10^{-8}$	$1.03x10^{-9}$	$5.18x10^{-6}$	$5.57x10^{-9}$	$2.07x10^{-9}$
	39%	0.63%	0.05%	0.23%	0.01%	60%	0.06%	0.02%
ADPE (kg Sb eq)	$2.67x10^{-5}$	$8.90x10^{-7}$	$3.16x10^{-7}$	$3.93x10^{-7}$	$7.80x10^{-9}$	$4.26x10^{-5}$	$2.83x10^{-8}$	$4.71x10^{-8}$
	38%	1.3%	0.45%	0.55%	0.01%	60%	0.04%	0.07%
ADPF (MJ eq)	49.6	4.54	0.681	1.68	$8.63x10^{-2}$	86.0	0.441	0.227
	35%	3.2%	0.48%	1.2%	0.06%	60%	0.31%	0.16%

Table 21. *Resource use and waste flows for the **Hush Blocks** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
Resources								
RPR_E (MJ)	7.11	$4.53x10^{-2}$	2.78	$1.91x10^{-2}$	$6.81x10^{-4}$	14.9	$1.68x10^{-3}$	$6.02x10^{-3}$
	29%	0.18%	11%	0.08%	0.00%	60%	0.01%	0.02%
RPR_M (MJ)	4.17	0.00	0.00	0.00	0.00	6.26	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
$NRPR_E$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
$NRPR_M$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
SM (kg)	0.163	0.00	0.00	0.00	0.00	0.244	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
RSF/NRSF (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
RE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
FW (m^3)	0.151	$2.71x10^{-3}$	$2.54x10^{-3}$	$1.17x10^{-3}$	$5.54x10^{-5}$	0.238	$1.39x10^{-4}$	$6.66x10^{-4}$
	38%	0.68%	0.64%	0.30%	0.01%	60%	0.04%	0.17%
Wastes								
HWD (kg)	$9.54x10^{-5}$	$9.77x10^{-6}$	$1.48x10^{-6}$	$4.48x10^{-6}$	$2.11x10^{-7}$	$1.70x10^{-4}$	$1.20x10^{-6}$	$4.89x10^{-7}$
	34%	3.5%	0.52%	1.6%	0.07%	60%	0.42%	0.17%
NHWD (kg)	0.596	0.166	0.467	$8.62x10^{-2}$	$8.41x10^{-2}$	2.87	$2.24x10^{-3}$	0.509
	12%	3.5%	9.8%	1.8%	1.8%	60%	0.05%	11%
HLRW (kg)	$1.05x10^{-5}$	$1.96x10^{-7}$	$1.47x10^{-7}$	$8.59x10^{-8}$	$3.11x10^{-9}$	$1.65x10^{-5}$	$6.97x10^{-9}$	$3.00x10^{-8}$
	38%	0.71%	0.53%	0.31%	0.01%	60%	0.03%	0.11%
ILLRW (kg)	$7.42x10^{-5}$	$3.04x10^{-5}$	$2.32x10^{-6}$	$1.10x10^{-5}$	$5.74x10^{-7}$	$1.84x10^{-4}$	$3.12x10^{-6}$	$8.35x10^{-7}$
	24%	9.9%	0.76%	3.6%	0.19%	60%	1.0%	0.27%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	0.00	0.142	0.00	$9.48x10^{-2}$
	0.00%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	40%
MER (kg)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
EE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

INA = Indicator not assessed | Neg. = Negligible

Table 22. *Carbon flows for the **Hush Blocks** acoustic ceiling panel products over a 75-yr time horizon. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
BCEPD (kg CO_2 eq)	0.362	0.00	0.00	0.00	0.00	0.564	0.00	$1.39x10^{-2}$
	39%	0%	0%	0%	0%	60%	0%	1%
BCEPK (kg CO_2 eq)	0.00	0.00	0.191	0.00	$6.58x10^{-3}$	0.296	0.00	0.00
	0%	0%	39%	0%	1%	60%	0%	0%
BCECC (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCERSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCENRSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 23. *Life Cycle Impact Assessment (LCIA) results for the **Hush Clad** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Impact Category	A1	A2	A3	A4	A5	B4	C2	C4
TRACI 2.1								
GWP (kg CO2 eq)	0.654	$8.53x10^{-2}$	$1.34x10^{-2}$	$2.83x10^{-2}$	$3.27x10^{-3}$	1.31	$7.71x10^{-3}$	$8.43x10^{-2}$
	30%	3.9%	0.61%	1.3%	0.15%	60%	0.35%	3.8%
AP (kg SO2 eq)	$2.77x10^{-3}$	$1.08x10^{-3}$	$7.53x10^{-5}$	$1.29x10^{-4}$	$1.18x10^{-5}$	$6.32x10^{-3}$	$4.44x10^{-5}$	$9.73x10^{-5}$
	26%	10%	0.71%	1.2%	0.11%	60%	0.42%	0.92%
EP (kg N eq)	$1.59x10^{-3}$	$1.04x10^{-4}$	$5.85x10^{-5}$	$3.09x10^{-5}$	$1.99x10^{-4}$	$4.27x10^{-3}$	$5.66x10^{-6}$	$8.56x10^{-4}$
	22%	1.5%	0.82%	0.43%	2.8%	60%	0.08%	12%
SFP (kg O3 eq)	$3.74x10^{-2}$	$2.14x10^{-2}$	$1.39x10^{-3}$	$3.10x10^{-3}$	$3.29x10^{-4}$	0.101	$1.26x10^{-3}$	$2.68x10^{-3}$
	22%	13%	0.82%	1.8%	0.19%	60%	0.75%	1.6%
ODP (kg CFC-11 eq)	$1.23x10^{-6}$	$1.91x10^{-8}$	$1.46x10^{-9}$	$6.56x10^{-9}$	$4.44x10^{-10}$	$1.90x10^{-6}$	$1.78x10^{-9}$	$9.01x10^{-10}$
	39%	0.61%	0.05%	0.21%	0.01%	60%	0.06%	0.03%
FFD (MJ eq)	1.16	0.174	$2.02x10^{-2}$	$5.99x10^{-2}$	$4.13x10^{-3}$	2.16	$1.59x10^{-2}$	$1.14x10^{-2}$
	32%	4.8%	0.56%	1.7%	0.11%	60%	0.44%	0.32%
CML-IA								
GWP (kg CO2 eq)	0.666	$8.53x10^{-2}$	$1.39x10^{-2}$	$2.83x10^{-2}$	$3.63x10^{-3}$	1.35	$7.71x10^{-3}$	$9.78x10^{-2}$
	30%	3.8%	0.61%	1.3%	0.16%	60%	0.34%	4.3%
AP (kg SO2 eq)	$2.67x10^{-3}$	$9.99x10^{-4}$	$6.90x10^{-5}$	$1.10x10^{-4}$	$9.61x10^{-6}$	$5.96x10^{-3}$	$3.60x10^{-5}$	$7.54x10^{-5}$
	27%	10%	0.69%	1.1%	0.10%	60%	0.36%	0.76%
EP (kg (PO4)3- eq)	$8.24x10^{-4}$	$1.37x10^{-4}$	$2.99x10^{-5}$	$2.55x10^{-5}$	$7.29x10^{-5}$	$2.16x10^{-3}$	$7.70x10^{-6}$	$3.43x10^{-4}$
	23%	3.8%	0.83%	0.71%	2.0%	60%	0.21%	9.5%
POCP (kg C2H4 eq)	$1.44x10^{-4}$	$2.75x10^{-5}$	$6.42x10^{-6}$	$3.76x10^{-6}$	$7.07x10^{-7}$	$3.00x10^{-4}$	$1.19x10^{-6}$	$1.70x10^{-5}$
	29%	5.5%	1.3%	0.75%	0.14%	60%	0.24%	3.4%
ODP (kg CFC-11 eq)	$9.20x10^{-7}$	$1.44x10^{-8}$	$1.12x10^{-9}$	$4.92x10^{-9}$	$3.34x10^{-10}$	$1.41x10^{-6}$	$1.34x10^{-9}$	$7.27x10^{-10}$
	39%	0.61%	0.05%	0.21%	0.01%	60%	0.06%	0.03%
ADPE (kg Sb eq)	$4.28x10^{-6}$	$2.34x10^{-7}$	$9.20x10^{-8}$	$9.83x10^{-8}$	$2.53x10^{-9}$	$7.11x10^{-6}$	$6.79x10^{-9}$	$1.97x10^{-8}$
	36%	2.0%	0.78%	0.83%	0.02%	60%	0.06%	0.17%
ADPF (MJ eq)	10.1	1.20	0.174	0.419	$2.80x10^{-2}$	18.1	0.106	$8.46x10^{-2}$
	33%	4.0%	0.58%	1.4%	0.09%	60%	0.35%	0.28%

Table 24. *Resource use and waste flows for the **Hush Clad** acoustic ceiling panel products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
Resources								
RPR_E (MJ)	0.547	$1.19x10^{-2}$	0.897	$4.79x10^{-3}$	$2.21x10^{-4}$	2.19	$4.03x10^{-4}$	$2.60x10^{-3}$
	15%	0.33%	25%	0.13%	0.01%	60%	0.01%	0.07%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$NRPR_E$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
$NRPR_M$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA
SM (kg)	$8.70x10^{-2}$	0.00	0.00	0.00	0.00	0.131	0.00	0.00
	40%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	0.00%
RSF/NRSF (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
RE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
FW (m^3)	$2.57x10^{-2}$	$7.13x10^{-4}$	$7.08x10^{-4}$	$2.93x10^{-4}$	$1.79x10^{-5}$	$4.16x10^{-2}$	$3.34x10^{-5}$	$3.09x10^{-4}$
	37%	1.0%	1.0%	0.42%	0.03%	60%	0.05%	0.44%
Wastes								
HWD (kg)	$1.42x10^{-5}$	$2.56x10^{-6}$	$3.16x10^{-7}$	$1.12x10^{-6}$	$6.83x10^{-8}$	$2.81x10^{-5}$	$2.88x10^{-7}$	$1.99x10^{-7}$
	30%	5.5%	0.67%	2.4%	0.15%	60%	0.61%	0.43%
NHWD (kg)	$8.49x10^{-2}$	$4.32x10^{-2}$	$6.11x10^{-3}$	$2.16x10^{-2}$	$2.72x10^{-2}$	0.458	$5.38x10^{-4}$	0.122
	11%	5.7%	0.80%	2.8%	3.6%	60%	0.07%	16%
HLRW (kg)	$1.97x10^{-6}$	$5.15x10^{-8}$	$3.58x10^{-8}$	$2.15x10^{-8}$	$1.01x10^{-9}$	$3.15x10^{-6}$	$1.67x10^{-9}$	$1.31x10^{-8}$
	38%	0.98%	0.68%	0.41%	0.02%	60%	0.03%	0.25%
ILLRW (kg)	$1.37x10^{-5}$	$8.06x10^{-6}$	$5.10x10^{-7}$	$2.75x10^{-6}$	$1.86x10^{-7}$	$3.94x10^{-5}$	$7.47x10^{-7}$	$2.36x10^{-7}$
	21%	12%	0.78%	4.2%	0.28%	60%	1.1%	0.36%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	0.00	$3.58x10^{-2}$	0.00	$2.38x10^{-2}$
	0.00%	0.00%	0.00%	0.00%	0.00%	60%	0.00%	40%
MER (kg)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
EE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

INA = Indicator not assessed | Neg. = Negligible

Table 25. *Carbon flows for the **Hush Clad** acoustic ceiling panel products over a 75-yr time horizon. All values are rounded to three significant digits.*

Parameter	A1	A2	A3	A4	A5	B4	C2	C4
BCEPD (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0%	0%	0%	0%	0%	0%	0%	0%
BCEPK (kg CO_2 eq)	0.00	0.00	$6.19x10^{-2}$	0.00	$2.13x10^{-3}$	$9.60x10^{-2}$	0.00	0.00
	0%	0%	39%	0%	1%	60%	0%	0%
BCECC (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCERSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCENRSF (kg CO_2 eq)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. LCA: Interpretation

With few exceptions, the contributions to total impact indicator results are dominated by the raw material extraction followed by upstream transport and product manufacturing. Downstream impacts are minimal.

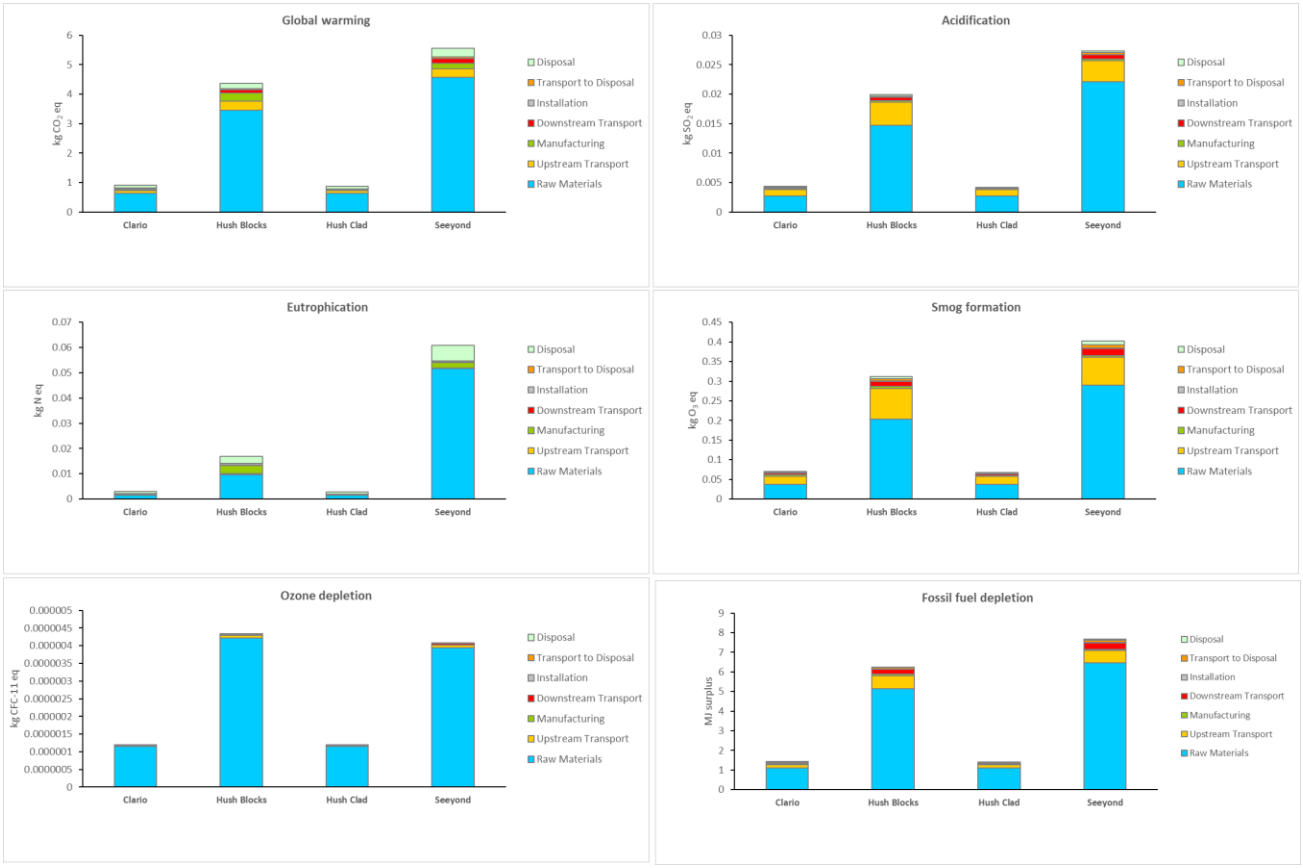

Figure 2. Contribution analysis for the ***3form*** *acoustic ceiling panel* product system – TRACI

7. Additional Environmental Information

For more information on 3form's certifications and environmental initiatives please view our website at www.3-form.com.

8. References

- Life Cycle Assessment of 3form Acoustic Ceiling Panels. SCS Global Services. Prepared for 3form. August 2022.
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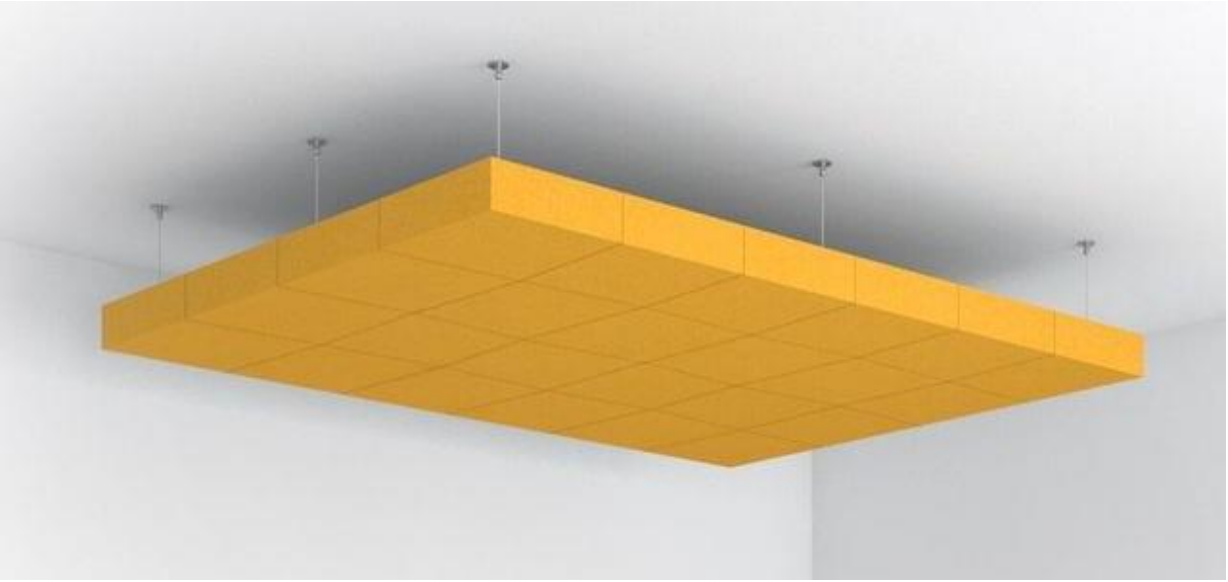

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