

Environmental Product Declaration

USG Ensemble® Acoustical Drywall Ceiling System

Walworth, WI



The USG Ensemble® Acoustical Drywall Ceiling system represents a revolutionary approach to building design. Installed and finished like traditional wallboard, this system provides a nondirectional, monolithic appearance with a fine texture while maximizing sound absorption. The result is a surface that looks like standard finished drywall but absorbs sound like traditional ceiling panels.



COMBINED USG SHEETROCK® BRAND ENSEMBLE® FOUR-SIDED TAPER™ PANEL AND 1" ENSEMBLE® HIGH-NRC BACKER PANEL

TRACI v2.1 Environmental Impacts)

Functional Unit – 1 sf	Cradle-to-Gate (A1-A3)	Cradle-to-Grave (A1-C4)
Global Warming Potential (kg CO ₂ eq.)	9.25E-01	1.13E+00
Ozone Depletion Potential (kg CFC-11 eq.)	2.70E-07	2.90E-07
Acidification Potential (kg SO ₂ eq.)	1.50E-03	1.95E-03
Eutrophication Potential (kg N eq.)	2.26E-04	2.75E-04
Photochemical Ozone Creation Potential (kg O ₃ eq.)	2.59E-02	3.52E-02
Abiotic Resource Depletion Potential Fossil Fuels (MJ, LHV)	2.80E+00	3.27E+00

For over a century, sustainable practices have naturally been an inherent part of our business at USG and CGC. Today, they help shape the innovative products that become the homes where we live, the buildings where we work and the arenas where we play. From the product formulations we choose, to the processes we employ, USG and CGC are committed to designing, manufacturing, and distributing products that minimize overall environmental impacts and contribute toward a healthier living space. We believe that transparency of product information is essential for our stakeholders and Environmental Product Declarations (EPDs) are the next step toward an even more transparent USG and CGC. For additional information, visit usg.com, cgcinc.com and usg.ecomedes.com.



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This declaration is an Environmental Product Declaration (EPD) in accordance with ISO 14025 and ISO 21930: 2017. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

DECLARATION NUMBER	EPD 559	
PROGRAM OPERATOR	ASTM International – 100 Barr Harbor Drive, West Conshohocken, PA USA www.astm.org	
EPD Type	Type III Declaration per ISO 14025:2006	
DECLARATION HOLDER	USG Corporation - 550 W. Adams St., Chicago, IL USA	
DECLARED PRODUCT	Ensemble® Acoustical Drywall Ceiling System	
REFERENCE PCR	UL Environment: PCR Guidance for Building-Related Products and Services; Part B: Non-Metal Ceiling Panel and Interior Wall EPD Requirements; April 13, 2021	
DATE OF ISSUE PERIOD OF VALIDITY	9/1/23 5 Years	
CONTENTS OF THE DECLARATION	This EPD is complete and contains the following: <ul style="list-style-type: none"> • Product System Documentation • Life Cycle Calculation Rules • Life Cycle Assessment Results • Further Information • References 	
This declaration was independently verified in accordance with ISO 14025 and ISO 21930:2017 <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL		Tim Brooke, ASTM International
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		Thomas P. Gloria, Industrial Ecology Consultants



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1. Product System Documentation

1.1 Product Description and Product Identification

The USG Ensemble® Acoustical Drywall Ceiling system consists of perforated 5/8" USG Sheetrock® Brand EcoSmart Firecode 30® gypsum board laminated front and back with non-woven scrims. During installation, these panels are screw attached to USG Drywall Suspension grid where the Ensemble® panels are finished using joint tape and joint compound and using traditional drywall installation methods. On the back surface of the 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels is installed USG Ensemble® High-NRC Backer panels. Finally, the face of the installed Ensemble® panels is spray coated using USG Ensemble® Spray-Applied Finish resulting in a monolithic drywall ceiling that is acoustically absorptive.

1.2 Designated Application – Product Features

- Nondirectional, monolithic appearance with fine texture
- Special perforated USG Sheetrock® Brand EcoSmart Firecode 30® panels to optimize sound performance
- Installs and finishes similar to traditional wallboard
- NRC 0.80 and CAC 40 when the Ensemble® system is installed according to USG installation instructions
- High light-reflective finish (LR-0.85) reduces fixture and energy use
- Acoustically transparent spray-applied finish

1.3 Product Technical Data

BASE PANEL	BACKER PANEL	NRC	CAC	LR	FIRE PERFORMANCE
USG Ensemble® Panels	1" USG Ensemble® High-NRC Backer Panel	0.80*	40	.85	Class A

* The reported system NRC of 0.80 requires the use of the 1" Ensemble® High-NRC Backer Panels.

Table 1: Performance Data

1.4 Placing on the Market/Application Rules

The USG Ensemble® Acoustical Drywall Ceiling system must be installed according to the "USG Ensemble Acoustical Drywall Ceiling" installation overview document and maintained in accordance with current USG written instructions and best industry practice.

1.5 Delivery Status

For the installation of the Ensemble system, USG Drywall Suspension main tees, cross tees, fasteners, paper joint tape and USG All Purpose Joint compound are sourced local to the jobsite. 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels, Ensemble® High-NRC Backer Panels, Ensemble® Ceiling Compound, and Ensemble® Spray-applied finish are shipped directly to the jobsite from the warehouse.



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1.6 Product Composition

Product Specifications for 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels	Measurement	Value
	Thickness	5/8 in. (15.9 mm)
	Lengths	8' and 10' (2438 and 3048 mm)
	Width	4' (1219 mm)
	Weight (nominal)	1.64 lbs./ ft ² (8.01 kg/m ²)
	Edges	Tapered on All Sides
Product Formulation for 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels	Additive	Percentage
	Gypsum	87.5%
	Paper	5.1%
	Additives	1.1%
	Scrims + Adhesive	6.3%
Product Specifications for 1" Ensemble® High-NRC Backer Panels	Measurement	Value
	Thickness	1 in. (25.4 mm)
	Lengths	Nominal 4' (1219 mm)
	Width	2' (609 mm)
	Weight (nominal)	1.11 lbs./ ft ² (5.42 kg/m ²)
	Edges	Square Edged
Product Formulation for 1" Ensemble® High-NRC Backer Panels	Additive	Percentage
	Mineral Wool	91.9%
	Binder	6.6%
	Additives	1.5%

Table 2: Product specifications and formula

1.7 Product Manufacture

The manufacture of 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels start with the combining of the dry ingredients in a screw conveyor, feeding of this dry ingredient mixture into a pin mixer where these dry ingredients are mixed with water and wet additives. The resulting slurry is fed between two sheets of paper; facing paper (Manila) on the bottom and backing paper (Newslined) on the top. The wet gypsum board is allowed to hydrate after which the hard board is cut and transferred into a kiln for evaporation of excess water. After removal of the evaporative water, the board is cut to its final size, perfed with nominal 3/8" holes and veils are adhesively applied front and back. End tapes are then applied and the resulting product is ready for shipment. Any gypsum board not meeting quality control specifications is shipped to an appropriate landfill.



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1" Ensemble® High-NRC Backer Panels are produced using conventional wet-formed technology. In this process, the tile ingredients are mixed into a dilute slurry, which is then formed onto a wire as a basemat. The base mats are then pressed and dried. The dried tiles are cut to the appropriate sizes and painted

1.8 Packaging

5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels are shipped as units of 26 finished panels on a wood pallet with cardboard corner protectors and a cardboard shroud.

Ensemble® High-NRC backer panels are shipped in bundles of 4 and stacked on a wood pallet with cardboard corner protectors.

USG Ensemble® Ceiling Compound is shipped in standard 4.5-gallon cartons. Ensemble® Spray-Applied Finish is shipped in 5-gallon pails.

1.9 Environment and Health During Manufacturing

USG and CGC have led the building sector's effort in developing and supplying sustainable construction materials. Today, sustainability is integrated into the design and manufacture of every wall, ceiling, and flooring product. As both a producer and a buyer of raw materials, we have a responsibility to extensively review and select each material we use. Each decision we make is based on careful consideration of environmental and safety effects over time. Raw materials used in our products are carefully selected and go through a screening procedure. Incoming raw materials are tested for contaminants by an internal lab and third-party labs for consideration of use and worker, environmental, and end-user exposure. This due diligence helps to ensure our products are safe to handle in our manufacturing plants and on job sites while having minimal impact on occupant health and indoor and outdoor environments.

1.10 Distribution

The default transport distances from the PCR (product transport from the point of manufacture to building site) of 497 miles (800 km) by truck were used in this analysis for all system components that are shipped from the warehouse. Locally obtained installation components are given a transport distance of 25 miles (40 km). Final transportation from the building site to waste processing was defaulted to 22 miles (35 km) by truck.

1.11 Product Installation

The USG Ensemble® Acoustical Drywall Ceiling system must be installed according to the procedures demonstrated during the required hands-on training with a USG Contractor Specialty Representative. Once the USG Drywall Suspension grid is installed, the USG Ensemble® High-NRC Backer Panels are laid into the grid. Then the Ensemble® panels are screwed to USG Drywall Suspension grid and are finished using joint tape and joint compound using traditional drywall installation methods. Finally, the face of the installed Ensemble® panels are spray coated using USG Ensemble® Spray-Applied Finish resulting in a monolithic drywall ceiling that is acoustically absorptive. Installation of USG's Ensemble® system is accomplished by manual labor using mostly hand tools. No material or energy inputs are required on the jobsite. A 7% installation waste factor was included in this study.



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1.12 Conditions of Use

To insure the longevity of the product, 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels and the system in total should not be exposed to moisture, high humidity, or high temperature. Criteria can be found in the USG warranty information specific to each product.

1.13 Environment and Health During Use Stage

This product is not expected to produce any unusual hazards during normal use. Exposure to high dust levels may irritate the skin, eyes, nose, throat, or upper respiratory tract. Proper personal protective gear should be worn by installer for protection. The installed system meets the California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010 (Emissions Testing Method for CA Specification 01350) emissions criteria for a high-performance product with respect to harmful VOC emissions.

1.14 Reference Service Life

A default RSL of 75 years shall be assumed for the Ensemble® system. An assumed Estimated Service Life (ESL) of 75 years shall be used for building life.

1.15 Re-Use Phase

USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels and USG Ensemble® High-NRC Backer Panels cannot be reused at the end of the building's life.

1.16 End-of-Life Disposal

USG is helping to meet the needs of a growing world and preserve natural resources by taking back approved ceiling panels from any manufacturer and recycling them into new building products. While USG encourages recycling of its ceiling panels through its take back program, all USG Ensemble® System waste generated during installation and at end-of-life is assumed to be disposed of in an appropriate landfill.

1.17 Extraordinary Effects

Fire

USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels covered by this EPD are certified to be Class A (flame spread of 25 or less, smoke developed of 50 or less per ASTM C84).



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2. LCA Calculation Rules

2.1 Functional Unit

The declared unit for the installed Ensemble® Acoustical Drywall Ceiling System is defined as one square meter with optional reporting of one square foot (12"x12") of installed Ensemble® system.

USG SHEETROCK® BRAND ENSEMBLE® FOUR-SIDED TAPER™ PANELS	VALUE AND UNITS	VALUE AND UNITS
Functional Unit	1 square meter	1 square foot
Conversion to kg	0.744 kg	1.64 lbs.

1" ENSEMBLE® HIGH-NRC BACKER PANEL	VALUE AND UNITS	VALUE AND UNITS
Functional Unit	1 square meter	1 square foot
Conversion to kg	0.503 kg	1.11 lbs.

Table 3: Functional unit

2.2 System Boundary

This EPD represents a “cradle-to-grave” LCA analysis for the USG Ensemble® Acoustical Drywall Ceiling System. It covers all the production steps from raw material extraction (i.e., the cradle) to end of life disposal (grave).

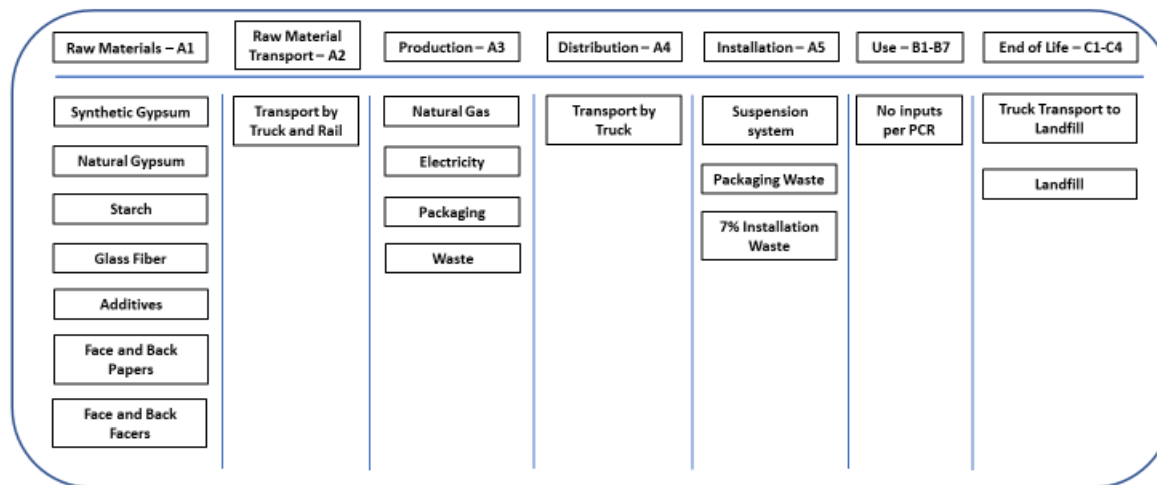


Figure 1: Specific processes by life cycle stage covered during the LCA study of USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels



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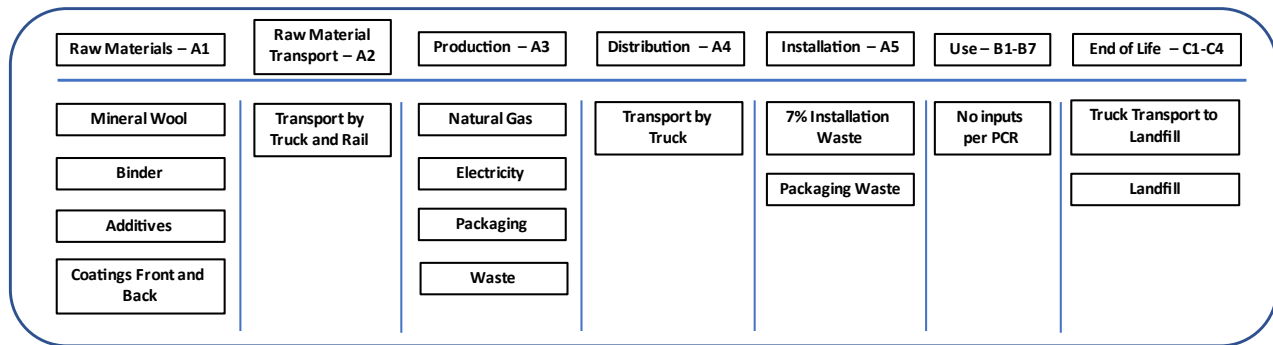


Figure 2: Specific processes by life cycle stage covered during the LCA study of Ensemble® High-NRC Backer Panels

2.3 Estimates and Assumptions

The system boundaries are cradle to grave (modules A1-C4) and include the following system processes in the production of USG Ensemble® System components: raw material extraction, raw material production, raw material transportation from suppliers to the production facility, product manufacturing and waste management, distribution, installation, use and end-of-life.

Additional data limitations include the use of proxy processes rather than actual supplier generated primary data. This would include such processes as starch, which is representative of wet-milled corn starch but may not necessarily be representative of USG’s particular starch supplier. In addition, the data is limited in that the primary data was collected during the 2022 year and changes in operations may increase/decrease impacts in the future. Other data limitations include the use of secondary data sets instead of primary data for upstream and downstream processes, local impacts vs. global impacts, possible impacts vs. actual impacts, inherent uncertainty in the data sets, accuracy and precision of impact assessment methodology, etc.

2.4 Cut-off Criteria

The All inputs and outputs to a (unit) process were included in the calculation for which data is available.

In case of insufficient input data or data gaps for a unit process, the cut-off criteria was 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows did not exceed 5% of energy usage and mass.

2.5 Background Data

All background was sourced from critically reviewed Sphera LCA for Experts databases.

2.6 Data Requirements and Data Sources

The LCA model was created using LCA for Experts software from Sphera. Specific comments related to data quality requirements cited in ISO 14025 Section 4.2.3.6.2 include the following.

Temporal: In the case of USG Ensemble® High-NRC Backer Panels and USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels, the LCI data was collected from the East Chicago, IN Cloquet, MN and Walworth, WI plants for the 2022 production year.



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Geographical: Where possible, all processes were chosen as being representative of US manufacturing processes.

Technical: The data selected for this study is specific to the technology used in the preparation of the various raw materials.

Precision: The raw material usage amounts were derived from plant quality data on finished products, coatings usage plant data and product formulas.

Completeness: Virtually all the significant raw material flows (> 99%) that make up the various Ensemble® system components have been modeled.

Representative: Where possible all the data sets were selected to be representative of US-based production, are less than 10 years in age and are representative of the technology being employed.

Consistency: All the manufacturing processes were modeled in a consistent manner throughout this study in accordance with the goal and scope definitions.

Reproducibility: The information contained in this study, including raw material, energy and transportation distance inputs, have been fully documented in the LCA report.

Sources of Data: The sources for the processes used in this study have been fully provided in the LCA report and are representative of the material and energy sources used in actual production.

Uncertainty: The relative uncertainty associated with this study has been minimized. No significant assumptions have been made.

2.7 Period Under Review

All raw material and energy inputs are for the 2022 calendar year.

2.8 Allocation

The LCI data was collected for the 2022 production year. Raw material inputs are specific to these panels and energy inputs were allocated based on the mass of these panels.

2.9 Comparability

A comparison or evaluation of EPD data is only possible if all data sets to be compared are 1) created according to EN 15804 and 2) are considered in a whole building context or utilize identical defined use stage scenarios. Comparisons are only allowable when EPDs report cradle-to-grave information using a functional unit. Refer to section 5.3 of EN 15804 for further information. Comparison of the environmental performance of panels using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with the PCR for North American Ceiling Panels allows EPD comparability only when all stages of a panel life cycle have been considered. However, variations and deviations are possible.



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3. LCA: Scenarios and additional technical information

Table 1. Transport to the building site (A4)

NAME	VALUE FOR ENSEMBLE® PANELS	VALUE FOR 1" ENSEMBLE® HIGH-NRC BACKER PANELS	UNIT
Fuel type	Diesel	Diesel	-
Liters of fuel	1.61E-03	1.09E-03	l/100km
Vehicle type	US Truck	US Truck	-
Transport distance	800	800	km
Capacity	0.67	0.67	
Gross density of products transported	504	200	kg/m ³

Table 2. Installation into the building (A5)

NAME	VALUE	UNIT
Ancillary materials	0	kg
Net freshwater consumption specified by water source and fate	0	m ³
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Material loss	7% of delivered weight	%
Ceiling Panel Mounting System (CPMS)	0.129	kg/SF
Output substances following waste treatment on site	7% of delivered weight	%
Dust in the air	~ 0	kg
VOC content	< 9	µg/m ³

Table 3. Use or application of the installed product (B1)

NAME	VALUE	UNIT
RSL	75	years
VOC	< 9	µg/m ³

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Table 4. Maintenance (B2)

NAME	VALUE	UNIT
Maintenance process information	As required by the PCR, a standard Life expectancy for ceiling panels based on historic practices of 75 years shall be used. No maintenance is required.	
Maintenance cycle	0	Number/ RSL
Maintenance cycle	0	Number/ ESL
Water consumption	0	m ³
Auxiliary	0	kg
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Material loss	0	kg

Table 5. End of Life (C1-C4)

NAME		ENSEMBLE® SYSTEM*	UNIT
Collection process (specified by type)	Collected separately	0	kg
	Collected with mixed construction waste	1.25	kg/SF
Recovery (specified by type)	Reuse	0	kg
	Recycling	0	kg
	Landfill	1.25	kg/SF
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	0	-
Disposal	Product or material for final deposition	1.25	kg/SF
Removals of biogenic carbon (excluding packaging)		0	kg CO ₂

* The Ensemble System refers to the combined Ensemble® Panel and the 1" Ensemble® High-NRC Backer Panel.



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4. Life Cycle Assessment Results

Product stage				Construction process stage				Use stage				End of life stage			
Raw Material Supply	Transport	Manufacturing	Transport	Construction-Installation Process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational water Use	De-construction Demolition	Transport	Waste processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Figure 3: System Boundary

4.1 Life Cycle Impact Assessment Results

Table 9: LCA Results using TRACI 2.1 Impacts

The following environmental LCA results are for the combined USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panel and the 1” Ensemble® High-NRC Backer Panel.

Environmental LCA Results for 1 Square Foot of USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panel and 1 Square Foot of 1” USG Ensemble™ High-NRC Backer Panel (A1-C4)								
Impact Assessment Method: TRACI 2.1		A1-A3	A4	A5	B1-B5	C4	C4	Total
Environmental Impact Category	Units	Impact	Impact	Impact	Impact	Impact	Impact	Impact
Global warming	kg CO2 eq.	9.25E-01	9.49E-02	7.98E-02	0.00E+00	1.04E-02	2.27E-02	1.13E+00
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	2.70E-07	2.47E-16	2.03E-08	0.00E+00	2.69E-17	1.17E-15	2.90E-07
Acidification Potential	kg SO2 eq.	1.50E-03	1.35E-04	1.41E-04	0.00E+00	4.36E-05	1.29E-04	1.95E-03
Eutrophication Potential (EP)	kg N eq.	2.26E-04	1.95E-05	1.98E-05	0.00E+00	3.95E-06	5.66E-06	2.75E-04
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	2.59E-02	3.04E-03	2.52E-03	0.00E+00	1.44E-03	2.38E-03	3.52E-02
Abiotic Depletion Potential (ADP) - fossil fuels	MJ surplus energy	2.80E+00	1.78E-01	2.30E-01	0.00E+00	1.94E-02	4.41E-02	3.27E+00

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The following LCA results are for the entire installed Ensemble® System including the Ensemble® Panel, the 1” Ensemble® High-NRC Backer Panel, USG Drywall Suspension System, fasteners, joint tape, joint compound, and Ensemble® Spray-Applied Finish coating.

Environmental LCA Results for 1 Square Foot of the Entire Ensemble System (A1-C4)								
Impact Assessment Method: TRACI 2.1		A1-A3	A4	A5	B1-B5	C4	C4	Total
Environmental Impact Category	Units	Impact	Impact	Impact	Impact	Impact	Impact	Impact
Global warming	kg CO2 eq.	9.25E-01	9.49E-02	6.01E-01	0.00E+00	1.21E-02	2.53E-02	1.66E+00
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	2.70E-07	2.47E-16	2.07E-08	0.00E+00	3.14E-17	1.29E-15	2.90E-07
Acidification Potential	kg SO2 eq.	1.50E-03	1.35E-04	5.63E-03	0.00E+00	5.06E-05	1.43E-04	7.46E-03
Eutrophication Potential (EP)	kg N eq.	2.26E-04	1.95E-05	1.26E-04	0.00E+00	4.59E-06	6.28E-06	3.83E-04
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	2.59E-02	3.04E-03	3.07E-02	0.00E+00	1.67E-03	2.64E-03	6.39E-02
Abiotic Depletion Potential (ADP) - fossil fuels	MJ surplus energy	2.80E+00	1.78E-01	6.22E-01	0.00E+00	2.26E-02	4.93E-02	3.68E+00

Table 10: LCA Results for Resources and Waste Flows

The following resource and waste flow results are for the combined USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panel and the 1” Ensemble® High-NRC Backer Panel.

Resource and Waste Flows for 1 Square Foot of 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels and 1 Square Foot of 1" USG Ensemble® High-NRC Backer Board (A1-C4)								
Use of Primary Resources	Units	A1-A3	A4	A5	B1-B7	C2	C4	Total
Renewable primary resources used as an energy carrier (PERE)	MJ, NCV	1.18E+00	5.36E-02	9.77E-02	0.00E+00	5.85E-03	4.57E-02	1.39E+00
Renewable primary resources with energy content used as material (PERM)	MJ, NCV	1.31E-04	0.00E+00	9.88E-06	0.00E+00	0.00E+00	0.00E+00	1.41E-04
Non-renewable primary resources used as an energy carrier (PENRE)	MJ, NCV	1.53E+01	1.34E+00	1.30E+00	0.00E+00	1.47E-01	3.50E-01	1.85E+01
Non-renewable primary resources with energy content used as material (PENRM)	MJ, NCV	4.79E-01	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	5.15E-01
Secondary material, secondary fuel and recovered energy								
Secondary Material (SM)	kg	A1-A3	A4	A5	B1-B7	C2	C4	Total
Renewable Secondary Fuel (RSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable Secondary Fuel (NRSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of Fresh Water	m3	6.06E-03	1.84E-04	4.78E-04	0.00E+00	2.01E-05	5.63E-05	6.80E-03
Additional inventory parameters for transparency								
		A1-A3	A4	A5	B1-B7	C2	C4	Total
Removals and emissions associated with biogenic carbon content of the bio-based product	kg CO2-eq.	-1.04E-01	0.00E+00	-1.04E-02	0.00E+00	-1.00E+00	0.00E+00	1.39E+00
Emission from calcination and uptake from carbonation	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+00
Removals and emissions associated with biogenic carbon content of the bio-based packaging	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+00
Emissions from land use change	kg CO2-eq.	1.62E-04	1.09E-04	2.73E-05	0.00E+00	1.19E-05	2.94E-05	1.39E+00
Emissions from combustion of waste from renewable sources used in production processes	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+00
Emissions from combustion of waste from non-renewable sources used in production processes	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E+00
Indicators describing waste								
		A1-A3	A4	A5	B1-B7	C2	C4	Total
Hazardous waste disposed	kg	7.39E-07	3.87E-12	5.62E-08	0.00E+00	4.22E-13	8.39E-12	7.95E-07
Non-hazardous waste disposed	kg	2.01E-01	1.17E-04	1.73E-01	0.00E+00	1.28E-05	1.25E+00	1.62E+00
High-level radioactive waste	kg	1.31E-04	3.85E-06	1.06E-05	0.00E+00	4.21E-07	3.89E-06	1.50E-04
Intermediate and low-level waste	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Assignments of output flows at the end-of-life								
		A1-A3	A4	A5	B1-B7	C2	C4	Total
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy exported (EE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



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USG Ensemble® Acoustical Drywall Ceiling System

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The following LCA results are for the entire installed Ensemble® System including the Ensemble® Panel, the 1” Ensemble® High-NRC Backer Panel, USG Drywall Suspension System, fasteners, joint tape, joint compound, and Ensemble® Spray-Applied Finish coating.

Resource and Waste Flows for 1 Square Foot of the Entire Ensemble® System (A1-C4)								
Use of Primary Resources	Units	A1-A3	A4	A5	B1-B7	C2	C4	Total
Renewable primary resources used as an energy carrier (PERE)	MJ, NCV	1.27E+00	5.82E-02	3.81E-01	0.00E+00	6.81E-03	5.05E-02	1.77E+00
Renewable primary resources with energy content used as material (PERM)	MJ, NCV	1.31E-04	0.00E+00	9.88E-06	0.00E+00	0.00E+00	0.00E+00	1.41E-04
Non-renewable primary resources used as an energy carrier (PENRE)	MJ, NCV	1.57E+01	1.46E+00	4.54E+00	0.00E+00	1.71E-01	3.91E-01	2.23E+01
Non-renewable primary resources with energy content used as material (PENRM)	MJ, NCV	4.79E-01	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	5.15E-01
Secondary material, secondary fuel and recovered energy		A1-A3	A4	A5	B1-B7	C2	C4	Total
Secondary Material (SM)	kg	4.49E-01	0.00E+00	4.81E-02	0.00E+00	0.00E+00	0.00E+00	4.97E-01
Renewable Secondary Fuel (RSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable Secondary Fuel (NRSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable Energy (RE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of Fresh Water	m3	1.19E+00	6.65E-02	9.48E-02	0.00E+00	1.64E-03	1.66E-03	1.36E+00
Additional inventory parameters for transparency		A1-A3	A4	A5	B1-B7	C2	C4	Total
Removals and emissions associated with biogenic carbon content of the bio-based product	kg CO2-eq.	-7.15E-02	0.00E+00	-7.94E-03	0.00E+00	-1.00E+00	0.00E+00	-1.08E+00
Emission from calcination and uptake from carbonation	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Removals and emissions associated with biogenic carbon content of the bio-based packaging	kg CO2-eq.	5.34E+00	0.00E+00	4.02E-01	0.00E+00	0.00E+00	0.00E+00	5.74E+00
Emissions from land use change	kg CO2-eq.	1.35E-04	4.90E-05	1.71E-05	0.00E+00	2.01E-06	2.43E-05	2.28E-04
Emissions from combustion of waste from renewable sources used in production processes	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Emissions from combustion of waste from non-renewable sources used in production processes	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Indicators describing waste		A1-A3	A4	A5	B1-B7	C2	C4	Total
Hazardous waste disposed	kg	1.37E-04	6.05E-06	1.08E-05	0.00E+00	1.19E-07	1.19E-07	1.54E-04
Non-hazardous waste disposed	kg	7.64E-01	2.54E-02	1.66E+00	0.00E+00	1.95E+01	2.00E+01	4.20E+01
High-level radioactive waste	kg	7.85E-02	7.99E-04	5.98E-03	0.00E+00	5.21E-05	5.32E-05	8.54E-02
Intermediate and low-level waste	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Assignments of output flows at the end-of-life		A1-A3	A4	A5	B1-B7	C2	C4	Total
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy exported (EE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



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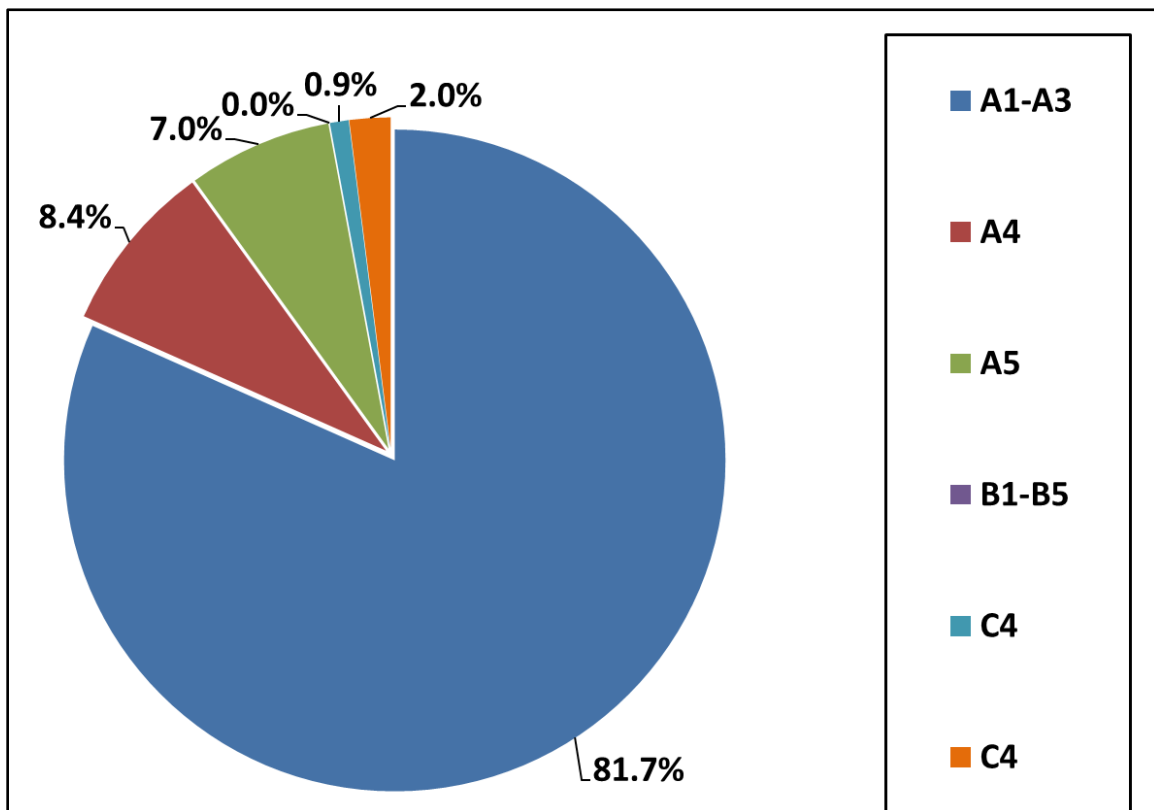
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5. LCA Interpretation

The cradle-to-grave LCA results for the combined 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panel and the 1" Ensemble® High-NRC Backer Panel were dominated by product production; primarily gas usage during the drying process for each component.

Figure 4: Process Dominance Analysis for GWP for 1 Square Foot of the Combined 5/8" USG Sheetrock® Brand Ensemble® Four-Sided Taper™ Panels and the 1" Ensemble® High-NRC Backer Panel



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6. References

LCA Report

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