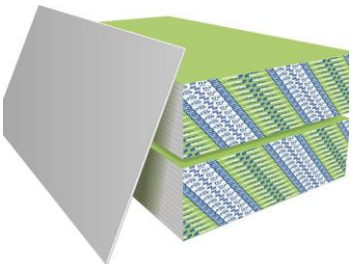
Environmental Product Declaration

1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard

Sweetwater, TX

USG CGC

1/2 in. (12.7 mm) Regular glass-mat panels with moisture and mold resistance



- Lightweight and easy to score, snap and fasten
- Moisture- and mold-resistant substrate
- Scores the highest achievable rating (10 out of 10) for mold resistance according to ASTM D3273
- Proprietary coating provides exceptional tile bond performance

TRACI V2.1 ENVIRONMENTAL IMPACTS (CRADLE-TO-GRAVE)	
Functional Unit – 1,000 sf (92.9 m^2)	
Global Warming Potential (kg CO_2 eq.)	**3.51E+02**
Ozone Depletion Potential (kg CFC-11 eq.)	**1.83E-07**
Acidification Potential (kg SO_2 eq.)	**9.00E-01**
Eutrophication Potential (kg N eq.)	**6.71E-02**
Photochemical Ozone Creation Potential (kg O_3 eq.)	**1.30E+01**
Abiotic Resource Depletion Potential Fossil Fuels (MJ, LHV)	**7.70E+02**

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; 2007. 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 546
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	1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard
REFERENCE PCR	NSF, Product Category Rules for Gypsum Panel Products, v1.1, April 2020
DATE OF ISSUE PERIOD OF VALIDITY	10/8/21 5 Years
CONTENTS OF THE DECLARATION	This EPD is complete and contains the following: • 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 ☐ INTERNAL ☒ 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 (Durock™ Brand Glass-Mat Tile Backerboard)

Durock™ Brand Glass-Mat Tile Backerboard is a water- and mold-resistant coated glassmat tile backerboard. The face of the panel is treated with a proprietary coating for moisture resistance and enhanced tile bond, making it ideal as a tile substrate for dry and/or wet areas Res 1 (Residential dry), Res 2 (Residential limited water exposure), Res 3 (Residential wet), Com1 (Commercial dry), Com2 (Commercial limited water exposure), Com3 (Commercial wet) as defined by the Tile Council of North America Handbook 2018.

1.2 Designated Applications (Durock™ Brand Glass-Mat Tile Backerboard)

- Lightweight and easy to score, snap and fasten
- Moisture- and mold-resistant substrate
- Scores the highest achievable rating (10 out of 10) for mold resistance according to ASTM D3273
- Proprietary coating provides exceptional tile bond performance wall and ceiling applications

1.3 Product Technical Data

Table 1: Summary of the technical data (1/2 in. Durock™ Brand Glass-Mat Tile Backerboard)

Property	Unit of Measure	Test Method	Result
Weight	psf	ASTM C473	1.7
Flexural Strength	lbf	ASTM C473	>100 (perpendicular) >800 (parallel)
Nail Pull	lb. (0.25 in. head diameter)	ASTM C473	>70
Shear Bond Strength	psi	ANSI A118.1/ANSI A118.4/ANSI A136.1	>50
Surface-burning characteristics	flame spread/smoke developed	ASTM E84	15/5
Fire Resistance	--	--	--
Thermal Resistance	hr-°F-ft^2/BTU	ASTM C518	0.42
Mold Resistance	--	ASTM D3273	10
Minimum Bending Radius	ft	--	12
Permeability	perm	ASTM E96 Procedure A	<3

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1.4 Placing on the Market/Application Rules

Standard rules for installing gypsum panel products are presented in the *USG Gypsum Construction Handbook* available online at usg.com and cgcinc.com.

1.5 Product Composition

Table 2: Product specifications and formula

	Measurement	Value
Product Specifications	Thickness	1/2 in. (12.7 mm)
	Lengths	8-12 ft. (2438-3658 mm)
	Width	4 ft. (1219 mm)
	Weight (nominal)	1.8 lb./sq. ft. (8.1 kg/m^2)
	Edges	Tapered

	Additive	Percentage
Product Formulation	Gypsum	89%
	Glass Mat	8%
	Additives	3%

1.6 Product Manufacture

The manufacture of gypsum panel products 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 glass-mat facers. The wet gypsum panel is allowed to hydrate after which the hard panel is cut and transferred into a kiln for evaporation of excess water. After removal of the evaporative water, the panel is cut to its final size, and the resulting product is ready for shipment. Any gypsum panel product not meeting quality control specifications is disposed of in an appropriate landfill.

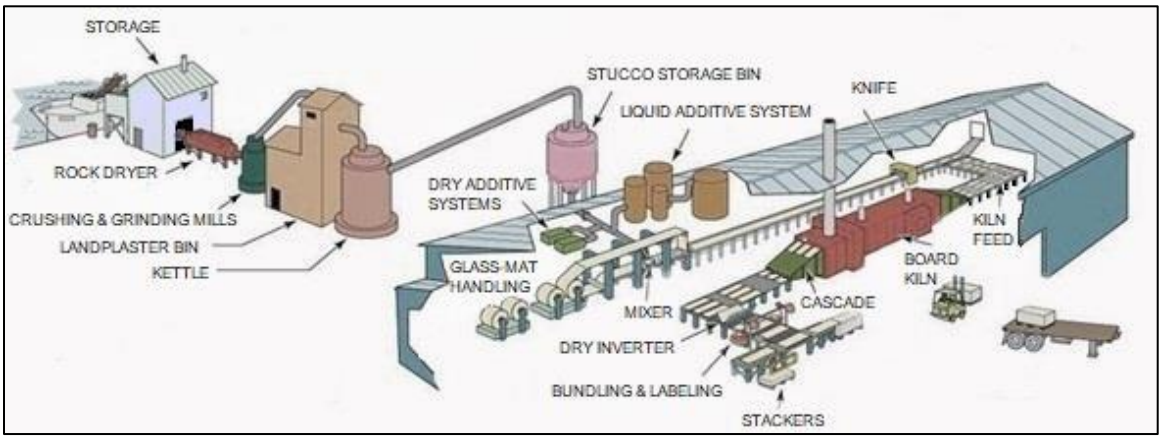

Figure 1: Process diagram for the production of glass mat gypsum panel products

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1.7 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.

1.8 Packaging

A quantity of units are collected and placed on sleutters (i.e., spacers) for easy pick-up by fork lift trucks.

1.9 Distribution

The default distances from the PCR for both truck 280 miles (451 km) and rail 130 miles (209 km) transport were used in this analysis. Final transportation from the distribution gate to the construction site was defaulted to 25 miles (40 km) by a single unit truck with an empty backhaul.

1.10 Product Installation

For installation of gypsum panel products, refer to Gypsum Association's GA-216*, Application and Finishing of Gypsum Panel Products*, ASTM C840, *Standard Specification for Application and Finishing of Gypsum Board*, published UL Design or GA File Number and *USG Gypsum Construction Handbook*.

As dictated by the PCR, "the default on-site installation waste" scenario for gypsum panels was 10% on a surface area basis of gypsum panel product. A 10% installation waste factor was adhered to in this LCA analysis.

Installation of the gypsum panel product into the building includes the manufacture and transportation of ancillary inputs and any energy or water required for installation or operation of the construction site. The installation stage included provision of all materials (joint tape, joint treatment, and fasteners) and energy required to install the product per industry standards. The amounts of joint tape, joint compound and fasteners required for installing 1,000 square feet (1 MSF) of gypsum panels was based on industry standards. In the case of Joint compound, the amount was based on the PCR for joint compound. Energy required during installation of this product is predominantly manual labor with minimal electricity which has been omitted in this analysis.

1.11 Environment and Health During Use Stage

Under normal conditions of intended use, this material does not pose a risk to the environment or occupant health.

1.12 Reference Service Life

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

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1.13 End-of-Life

Currently, glass mat gypsum panel products are typically disposed of in a building and construction landfill. In certain areas, USG has agreements with third-party gypsum waste recyclers who collect gypsum construction waste at jobsites for recycling and then transport this post-consumer gypsum raw material to specific USG manufacturing plants for use in the manufacturing of new gypsum panel products. There are several alternative options to landfilling such as the use of reground gypsum panels for soil amendment applications. Contact your local EPA for reuses rules and regulations.

2. LCA Calculation Rules 2.1 Functional Unit

The functional unit for this LCA study is 1,000 sf (92.9 m^2) of product. This functional unit is consistent with the PCR.

Table 3: Functional unit

Gypsum Board	Value and Units
Functional Unit	1,000 sf (92.9 m^2)
Declared Density	1660 lbs./MSF
Declared Density	8.11 kg/m^2

2.2 System Boundary

This cradle-to-grave (A1-C4) LCA study covers all the production steps from raw materials extracted from the earth (the cradle) to pallets of gypsum panel products ready to be shipped from the plant as well as distribution, installation (including contributions from fasteners, joint tape, and joint compound), use and end of life stages (the grave). This study also includes the preparation of an intermediate LCA on joint compound used in the installation of this product.

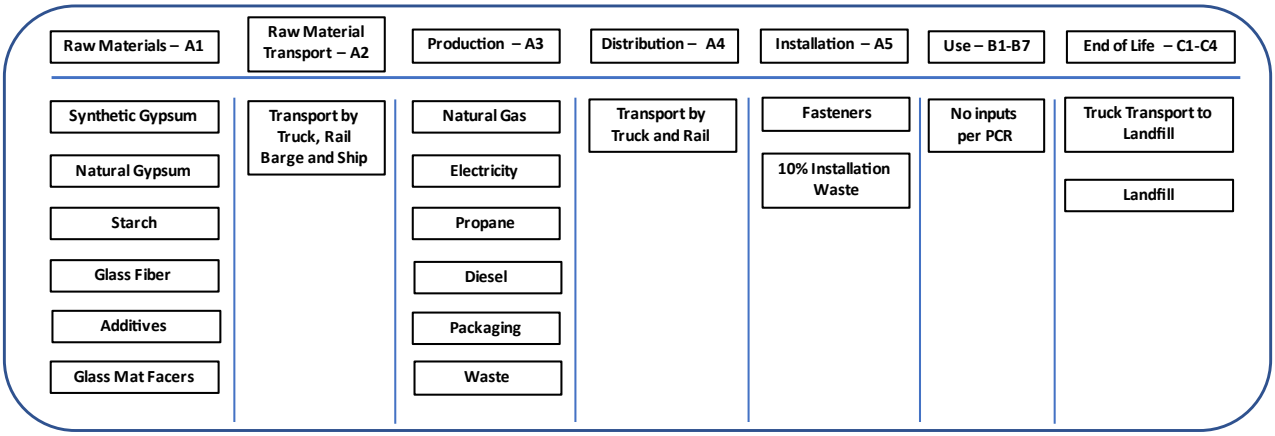

Figure 2: Specific processes covered by this EPD by life cycle stage

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2.3 Estimates and Assumptions

1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard raw material and energy inputs are specific to the products produced at the relevant manufacturing plants.

2.4 Cut-off Criteria

The cut-off criteria for input flows to be considered within each system boundary were as follows:

Mass – if a flow is less than 1% of the cumulative mass of the model flows it may be excluded, providing its environmental relevance is minor.

Energy – if a flow is less than 1% of the cumulative energy of the system model it may be excluded, providing its environmental relevance is minor.

The sum of the excluded material flows must not exceed 5% of mass, energy, or environmental relevance.

2.5 Background Data

All background was sourced from critically reviewed GaBi databases.

2.6 Data Requirements and Data Sources

Manufacturer specific data was obtained from each manufacturing plant in the United States. The LCA model was created using GaBi ts software. 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 1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard, the LCI data was collected from the relevant manufacturing plant for the 2019 calendar year.

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

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

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

Completeness: Virtually all the significant raw material flows (> 99%) used for panel production has been modeled. The exception consists of transportation of the coating raw materials; the effect of which was determined to be less than 1% of the total.

Representative: Where possible all the data sets were selected to be representative of U.S.-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.

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2.7 Period Under Review

All raw material and energy inputs are from the 2019 calendar year.

2.8 Allocation

The LCI data was collected for the gypsum panel product from the relevant manufacturing plants for the 2019 production year. Raw material and energy inputs were allocated to 1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard based on the mass of those panels.

2.9 Comparability

Any comparison of EPDs shall be subject to the requirements of ISO 14025:2006 section 6.7.2, ISO 21930:2017 section 5.5, and NSF Part B PCR for Gypsum Panel Products, section 5.5.

3. Life Cycle Assessment Results

Figure 3: System Boundary

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

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3.1 Life Cycle Impact Assessment Results

Table 4: LCA Results using TRACI 2.1 Impacts

Environmental LCA Results for 1,000 SF of 1/2" Durock™ Brand Glass-Mat Tile Backerboard (A1-C4)							
Impact Assessment Method: TRACI 2.1		**A1-A3**	**A4**	**A5**	**B1-B7**	**C1-C4**	**Total A1-C4**
Environmental Impact Category	**Units**	**Impact**	**Impact**	**Impact**	**Impact**	**Impact**	**Impact**
Global warming	kg CO2 eq.	2.42E+02	3.45E+01	3.36E+01	0.00E+00	4.12E+01	3.51E+02
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	1.65E-07	6.90E-15	1.83E-08	0.00E+00	1.13E-13	1.83E-07
Acidification Potential	kg SO2 eq.	5.95E-01	5.16E-02	8.36E-02	0.00E+00	1.69E-01	9.00E-01
Eutrophication Potential (EP)	kg N eq.	4.16E-02	8.35E-03	6.11E-03	0.00E+00	1.10E-02	6.71E-02
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	7.54E+00	1.16E+00	1.18E+00	0.00E+00	3.15E+00	1.30E+01
Abiotic Depletion Potential (ADP) - fossil fuels	MJ surplus energy	5.53E+02	6.47E+01	7.14E+01	0.00E+00	8.18E+01	7.70E+02

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Table 5: LCA Results for Resources Usages

Resource and Waste Flows for 1,000 SF of 1/2" Durock™ Brand Glass-Mat Tile Backerboard (A1-C4)							
Use of Primary Resources		**A1-A3**	**A4**	**A5**	**B1-B7**	**C1-C4**	**Total A1-C4**
Renewable primary resources used as an energy carrier (RPRE)	MJ, NCV	4.23E+02	2.01E+01	5.45E+01	0.00E+00	4.76E+01	5.45E+02
Renewable primary resources with energy content used as material (RPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources used as an energy carrier (NRPRE)	MJ, NCV	4.77E+03	4.89E+02	6.19E+02	0.00E+00	6.38E+02	6.51E+03
Non-renewable primary resources with energy content used as material (NRPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary material, secondary fuel and recovered energy		**A1-A3**	**A4**	**A5**	**B1-B7**	**C1-C4**	**Total A1-C4**
Secondary Material (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable Secondary Fuel (RSF)	MJ, NCV	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
Renewable Energy (RE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of Fresh Water	m3	1.58E+00	8.60E-02	1.92E-01	0.00E+00	9.26E-02	1.95E+00
Additional inventory parameters for transparency		**A1-A3**	**A4**	**A5**	**B1-B7**	**C1-C4**	**Total A1-C4**
Removals and emissions associated with biogenic carbon content of the bio-based product	kg CO2-eq.	-2.49E+01	0.00E+00	0.00E+00	0.00E+00	2.49E+01	0.00E+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
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
Emissions from land use change	kg CO2-eq.	3.76E-02	3.33E-02	1.28E-02	0.00E+00	3.05E-02	1.14E-01
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
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
Indicators describing waste		**A1-A3**	**A4**	**A5**	**B1-B7**	**C1-C4**	**Total A1-C4**
Hazardous waste disposed	kg	1.47E-04	4.08E-08	1.66E-05	0.00E+00	5.89E-08	1.64E-04
Non-hazardous waste disposed	kg	1.23E+01	4.49E-02	8.54E+01	0.00E+00	7.57E+02	8.55E+02
High-level radioactive waste	kg	9.50E-02	1.39E-03	1.13E-02	0.00E+00	4.60E-03	1.12E-01
Intermediate and low-level waste	kg	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**	**C1-C4**	**Total A1-C4**
Components for re-use (CRU)	kg	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
Materials for energy recovery (MER)	kg	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

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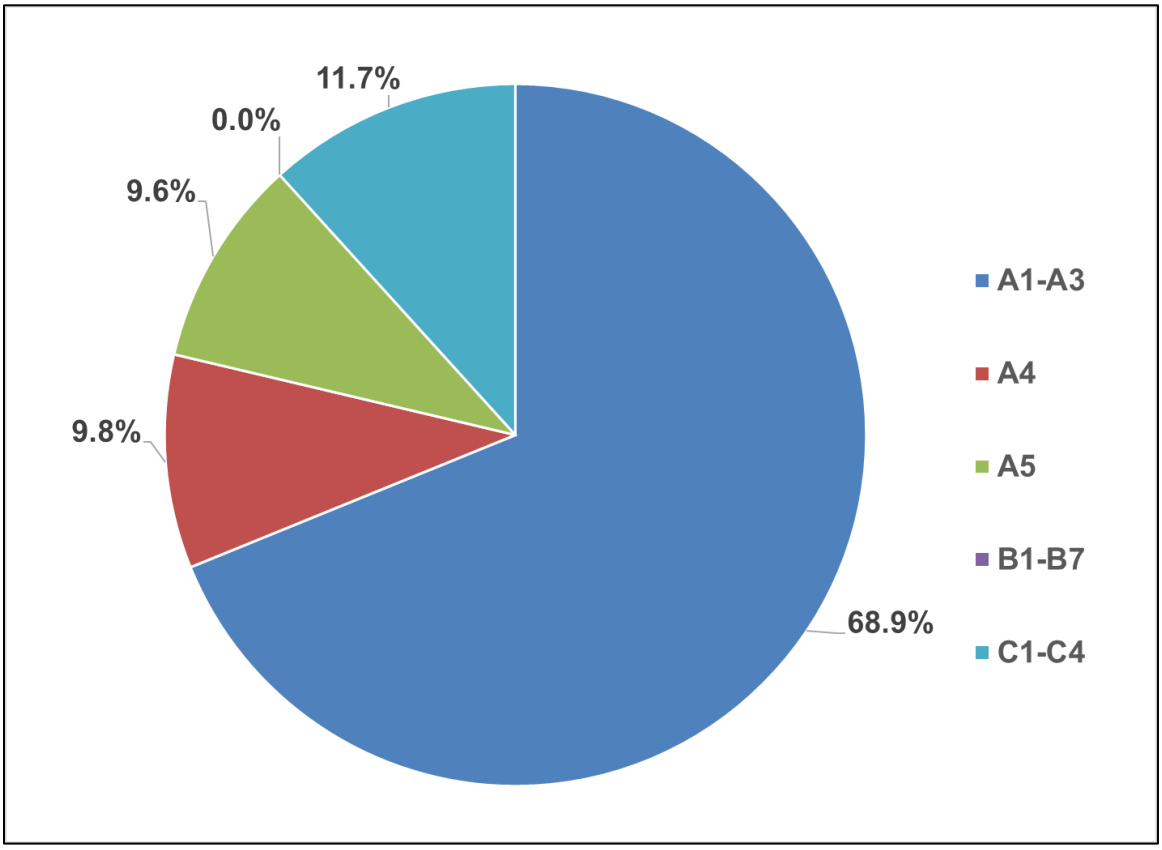
4. LCA Interpretation

The figure below graphically depicts the relative contributions for the cradle-to-grave production of 1,000 sf of 1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard. The dominant source of greenhouse gases are generated during the panel drying process. This analysis is typical for all gypsum plants covered in this study. Future reductions in Global Warming Potential should be directed at reducing the amount of water entering the dryer.

Figure 4: Process Dominance Analysis for the Production of 1 MSF of 1/2 in. (12.7 mm) Durock™ Brand Glass-Mat Tile Backerboard



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5. References

LCA Report

A Cradle-to-Gate (A1-A3) and Cradle-to-Grave (A1-C4) Life Cycle Assessment of Selected Sheetrock® Brand, Securock® Brand and Durock™ Brand Glass-Mat Gypsum Panel Products, 9/3/21. USG (Confidential)

Product PCR

NSF International - Product Category Rule for Environmental Product Declarations, PCR for Gypsum Panel Products, v1.1, April 2020.

Sustainability Reporting Standards

EN 15804:2012-04 - Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product

ISO 14025:2006 - Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14040:2006/Amended 1:2020 - Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006/Amended 2:2020 - Environmental management – Life cycle assessment – Requirements and guidelines

ISO 14046:2013 - Environmental management- Water footprint- Principles, requirements and guidelines

ISO 15392:2008 - Sustainability in building construction- General principles

ISO 15686-1:2011 - Buildings and constructed assets- Service life planning- Part 1: General principles

ISO 15686-2:2008 - Buildings and constructed assets- Service life planning Part 2: Service life prediction procedures

ISO 15686-7:2008 - Buildings and constructed assets- Service life planning Part 7: Performance evaluation for feedback of service life data from practice

ISO 15686-8:2008 - Buildings and constructed assets- Service life planning Part 8: Reference service life and service life estimation

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

Additional References

UL Environment - Product Category Rule (PCR) Guidance for Building-Related Products and Services Part B: Joint Compound EPD Requirements, ULE 10010-30, v.1, August 3, 2016.

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