

APPENDIX C-018113 – LEED v4.1 MATERIALS REPORTING FORM (FOR REFERENCE ONLY)

LEED-NC v4 Materials Reporting Form

Please complete this form for all permanently installed products within the Divisions noted below. Check boxes for the appropriate product type and complete all fields as indicated. Provide backup documentation for each environmental claim. See page 2 for definitions and submittal requirements.

Submittal Number : N/A		Product Name or Model # : Sheetrock Firecode X		Total Material Cost (w/o site labor/equip) :	
Submittal Name : N/A		Manufacturer : USG		Location of Product : Interior <input checked="" type="checkbox"/> Exterior <input type="checkbox"/>	
Subcontractor : N/A		Manufacturer Contact : N/A		Is product used in building structure or enclosure? Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	

REQUIRED FOR ALL PRODUCTS - DIVS 3-12, 31, 32

1. MRc2 Environmental Product Declaration (EPD)

Does the product have one of the documents listed below:

a) EPD Y ☒ N ☐

b) 3rd Party Life Cycle Assessment (LCA) Y ☒ N ☐

2. MRc3 Sourcing of Raw Materials

Does the product's manufacturer have a corporate sustainability report?

Y ☒ N ☐

Does the product meet one of the attributes below?

a) Take-back program Y ☐ N ☒

b) Bio-based materials 0 %

c) Materials reuse 0 %

d) FSC Certified Wood 0 %

- COC# N/A

e) Recycled content

- Pre-consumer 0.60 %

- Post-consumer 5.40 %

f) Extraction, manufacture, and purchase locations all within 100 miles? Y ☐ N ☒

3. MRc4 Material Ingredients

Does the product disclose material ingredients via one of the applicable programs below?

a) Manufacturer Inventory Y ☐ N ☒

b) Health Product Declaration Y ☒ N ☐

c) Cradle to Cradle Certificate Y ☐ N ☒

d) GreenScreen Assessment Y ☒ N ☐

e) REACH Optimization Y ☐ N ☒

f) Declare Label Y ☐ N ☒

g) UL Product Lens Y ☐ N ☒

REQUIRED FOR INTERIOR PRODUCTS - ALL DIVS

4. EQc2 Low-Emitting Materials

Select the appropriate section for the type of product submitted:

☐ ADHESIVES / SEALANTS / PAINTS / COATINGS

Provide VOC content (grams/Liter): _____ g/L

Estimate installed volume (Liters): _____ L

General Emissions Evaluation available?: Y ☐ N ☐

Type of documentation:

3rd Party Certificate* ☐ or Testing Report ☐

TVOC range:

<0.5 mg/m³ ☐ 0.5-5.0 mg/m³ ☐ >5.0 mg/m³ ☐

☐ COMPOSITE WOOD PRODUCTS

Confirm CARB compliance with one of the following:

ULEF ☐ or NAF ☐ or CARB Exempt ☐

☒ FLOORING / CEILINGS / WALLS / INSULATION PRODUCTS

General Emissions Evaluation available?: Y ☒ N ☐

Type of documentation:

3rd Party Certificate* ☒ or Testing Report ☐

TVOC range:

<0.5 mg/m³ ☒ 0.5-5.0 mg/m³ ☐ >5.0 mg/m³ ☐

OR, is the product inherently non-emitting? Y ☐ N ☒

☐ FURNITURE PRODUCTS

Furniture Evaluation available?: Y ☐ N ☐

Type of documentation:

3rd Party Certificate* ☐ or Testing Report ☐

Contractor Certification:

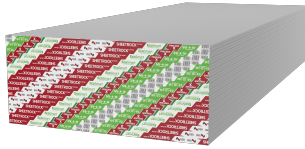
I _____ a duly authorized representative of _____ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualification during the purchasing period will require prior written approval from the Construction Manager and Owner.

Signature of Authorized Representative _____ Date: _____

* See the USGBC Low-Emitting Materials Third Party Certification table for acceptable 3rd party certifications and programs: <https://www.usgbc.org/resources/low-emitting-materials-third-party-certification-table>

SUSTAINABLE DESIGN REQUIREMENTS

018113- 30



USG Sheetrock® Brand EcoSmart Panels Firecode® X

Category

Drywall

Subcategory

Drywall Panels

Thickness

5/8 in

[+ Project](#)[Contact Manufacturer](#)

General

Contact Email	USG4YOU-technicalsupport@usg.com
Contact Phone	800.USG.4YOU (874.4968)
Corporate Sustainability Report (CSR) Link	External Link
Corporate Sustainability Report (CSR)	Yes
MasterFormat® Number	09 29 00
Model Number	141167
Recyclable	100%
Recyclable packaging	100%
Thickness	5/8 in
Type	Fire-Resistant Panels



Certifications and Standards

CA Section 01350	Yes
Environmental Product Declaration (EPD)	<i>Product Specific EPD</i>
Global Warming Potential 10% Reduction	Yes
Health Product Declaration (HPD)	<i>Document Source</i>
Living Building Challenge Declare®	<i>LBC Red List Free Certified by International Living Future Institute</i>
UL GREENGUARD GOLD Certificate	<i>Document Certified by UL Environment</i>



Product Information

Halogenated Flame Retardents Free	Yes
Rapidly Renewable Materials (%)	0.9%



Recycled Content

The recycled content data from the manufacturing plant closest to the zip code setting is displayed first and used for calculating credit contributions. Changing the zip code setting at the top of the page will re-evaluate which manufacturing plant is closest.

Manufacturing Location

Aliquippa, PA 15001
Pre-consumer: 89.00%

Post-consumer: 5.40%

Bridgeport, AL 35740
Pre-consumer: 89.20%

Post-consumer: 5.40%

Galena Park, TX 77547
Pre-consumer: 93.10%

Post-consumer: 1.40%

Jacksonville, FL 32208
Pre-consumer: 89.00%

Post-consumer: 5.40%

Norfolk, VA 23523
Pre-consumer: 89.20%

Post-consumer: 5.30%

Plaster City, CA 92243
Pre-consumer: 0.60%

Post-consumer: 5.40%

Rainier, OR 97048
Pre-consumer: 0.60%

Post-consumer: 12.70%

Shoals, IN 47581
Pre-consumer: 89.30%

Post-consumer: 5.20%

Sigurd, UT 84657
Pre-consumer: 5.80%

Post-consumer: 0.00%

Sperry, IA 52650
Pre-consumer: 1.50%

Post-consumer: 5.20%

Sweetwater, TX 79556
Pre-consumer: 1.40%

Post-consumer: 4.50%

Washingtonville, PA 17821
Pre-consumer: 90.40%

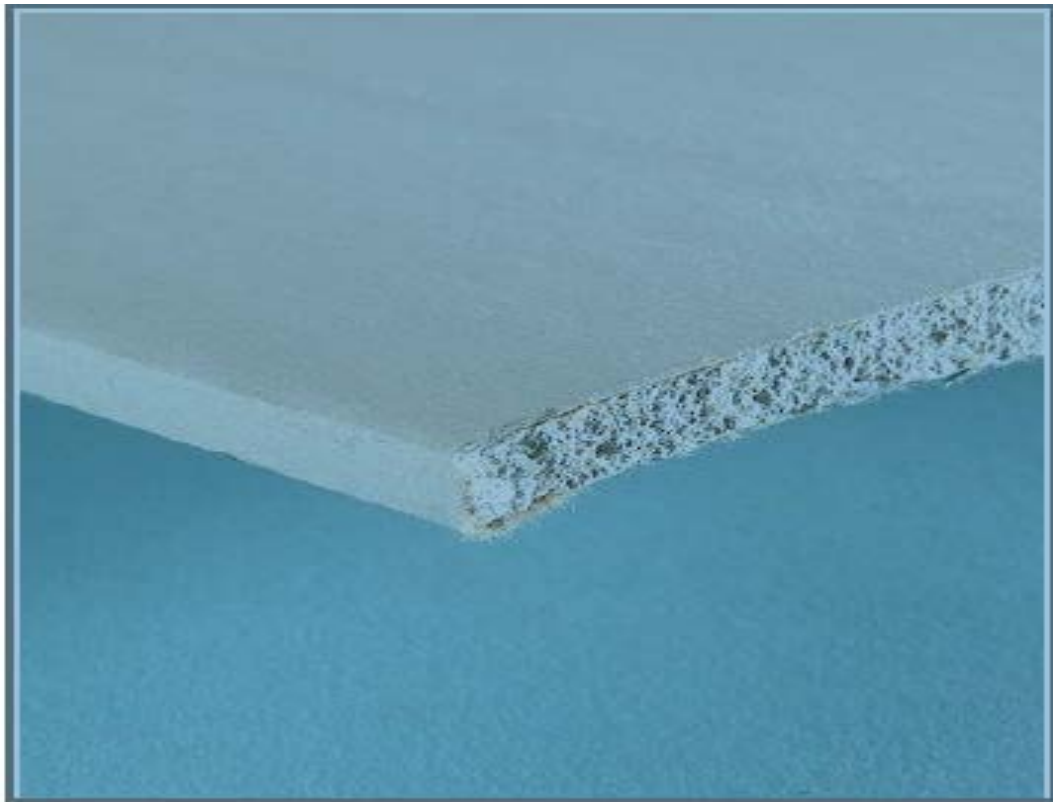
Post-consumer: 4.00%

The information contained in this site was provided by the producer and/or certifier and we endeavor to keep the information up to date and correct. ecomedes make no representations or warranties of any kind, express or implied, about the completeness or availability of the product information on the site for any purpose. We encourage users to contact the producer or certifier directly for additional details. It's important to note that no products individually or collectively, can guarantee a specific number of points for LEED, WELL, GreenGlobes or LBC certifications.

An Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017

An industry average cradle-to-gate EPD for $\frac{5}{8}$ " Type X Conventional Gypsum Board produced by Gypsum Association member companies for the USA and Canadian Markets.





NSF Certified Environmental Product Declaration

This is an industry average (also known as an "industry-wide" cradle-to-gate EPD) business-to-business Type III environmental product declaration for 5/8" (15.9 mm) Type X conventional gypsum board as manufactured by the Gypsum Association (GA) member companies in the USA and Canada conforming to ASTM C1396, Standard Specification for Gypsum Board [1]. This declaration has been prepared in accordance with ISO 21930 [2], ISO 14025 [3], ISO 14040 [4], ISO 14044 [5] the governing NSF International product category rules (PCR) for preparing an environmental product declaration for gypsum panel products [6] and NSF International's EPD program operator rules [7].

The intent of this document is to further the development of environmentally compatible and more sustainable construction products by providing comprehensive environmental information related to potential environmental impacts of 5/8" (15.9 mm) Type X conventional gypsum board available in the USA and Canada in accordance with international standards.

Environmental Product Declaration Summary

General Summary

Owner of the EPD



Gypsum Association (GA)

6525 Belcrest Road, Suite 480

Hyattsville, MD 20782

Link (URL): www.gypsum.org

info@gypsum.org

The GA is a not-for-profit trade association founded in 1930. Its mission is to promote the use of gypsum while advancing the development growth, and general welfare of the gypsum industry in the United States (U.S.) and Canada on behalf of its member companies. GA members include all the active gypsum panel product manufacturers in the U.S. and Canada. To be eligible for membership in the Association, a firm or corporation must calcine gypsum and manufacture gypsum board under the provisions of ASTM Standard C1396.

NSF Certification, LLC

Ann Arbor, MI

www.nsf.org

Date of issue: 28/04/2020

Period of validity: 5 years

Declaration No.: EPD 10270

General Summary

Each GA member company provided both LCI and meta-data for the reference year 2017. GA members, with the inclusion of their Canadian holdings and affiliates, produce and ship over 90% of the gypsum board consumed in the USA and Canada.

The owner of the declaration is liable for the underlying information and evidence.

GA Member Companies Corporate Locations



American Gypsum Company LLC
3811 Turtle Creek Blvd., Suite 1200
Dallas, TX 75219, USA
Member Link (URL):
<http://www.americangypsum.com/>






CertainTeed Gypsum, Inc.
CertainTeed Gypsum Canada, Inc.
20 Moores Road
Malvern, PA 19355, USA
Member Link (URL):
<http://www.certainteed.com/gypsum>





Continental Building Products
12950 Worldgate Drive, Suite 700
Herndon, VA 20170, USA
Member Link (URL):
<http://www.continental-bp.com/en/>



Georgia-Pacific Gypsum LLC
133 Peachtree Street NE
Atlanta, GA 30303, USA
Member Link (URL):
<http://www.buildgp.com/Georgia-Pacific-Gypsum>

General Summary	
	National Gypsum Company 2001 Rexford Road Charlotte, North Carolina 28211, USA Member Link (URL): http://nationalgypsum.com/
	PABCO® Gypsum 10600 White Rock Road, Suite 100 Rancho Cordova, CA 95670, USA Member Link (URL): http://www.pabco gypsum.com/
	United States Gypsum Company 550 West Adams Street Chicago, IL 60661-3676, USA Member Link (URL): https://www.usg.com/content/usgcom/en.html Canadian Gypsum Company (CGC) Inc. 350 Burnhamthorpe Road West 5th Floor Mississauga, ON, L5B 3J1, Canada Member Link (URL): https://www.usg.com/content/usgcom/en_CA_east.html
Product Group and Name	Gypsum board
Product Description	Gypsum board is the generic name for a family of sheet products consisting of a non-combustible core primarily of gypsum with a paper facing [5], [8] (UNCPC Code 3699, NAICS Code 327420).
Product Category Rules (PCR)	NSF International, Product Category Rule for Environmental Product Declarations, PCR for Gypsum Panel Products, April 2020 [5].
Certification Period	28.04.2020 - 27.04.2025
Declared Unit	92.9 m ² (1,000 square feet) of $\frac{5}{8}$ " (15.9 mm) Type X conventional gypsum board.
NSF Declaration Number	EPD 10270

EPD and Project Report Information			
Program Operator		NSF Certification, LLC	
Declaration Holder		Gypsum Association (GA)	
Product group	Date of Issue	Period of Validity	Declaration Number
Gypsum board	28.04.2020	5 years	EPD 10270
Declaration Type			
A "cradle-to-gate" EPD for 5/8" Type X conventional gypsum board manufactured by GA members. Activity stages or information modules covered include production with the product ready for shipment at the manufacturing plant (modules A1 to A3). The declaration is intended for use in Business-to-Business (B-to-B) communication.			
Applicable Countries			
United States and Canada			
Product Applicability			
Gypsum board products are used extensively in building construction and renovation as an enclosing surface for interior walls and ceilings providing a finishing surface as well as mold and fire resistance.			
Content of the Declaration			
This declaration follows <i>Section 9; Content of an EPD</i> , NSF International, Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products, April 2020 [5].			
This EPD was independently verified by NSF in accordance with ISO 14025 and the reference PCR:		 Jenny Oorbeck, joorbeck@nsf.org	
Internal	<u>External</u>		
	X		
The Project Report		An Industry Average Cradle-to-Gate Life Cycle Assessment of 1/2" Lightweight and 5/8" Type X conventional Gypsum Board for the USA and Canadian Markets, April 2020.	
Prepared by		Lindita Bushi, Ph.D. and Mr. Jamie Meil Athena Sustainable Materials Institute info@athenasmi.org www.athenasmi.org	
 Athena Sustainable Materials Institute			



Industry Average EPD for 5/8" Type X Conventional Gypsum Board

EPD and Project Report Information

This EPD project report was independently verified by NSF in accordance with ISO 14025, ISO 14040/44 and the reference PCR:

Jack Geibig – EcoForm

jgeibig@ecoform.com

PCR Information

Program Operator	NSF Certification, LLC
Reference PCR	NSF International, Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products [5].
Date of Issue	April 2020
PCR review was conducted by:	Thomas P. Gloria, PhD (Chair), Industrial Ecology Consultants, t.gloria@industrial-ecology.com Mr. Jack Geibig, EcoForm Mr. Bill Stough, Sustainable Research Group

NSF Certification, LLC
Ann Arbor, MI
www.nsf.org

Date of issue: 28/04/2020
Period of validity: 5 years
Declaration No.: EPD 10270

1 PRODUCT IDENTIFICATION

1.1 PRODUCT DEFINITION

Gypsum board (UN CPC Code 3699, NAICS Code 327420), is manufactured to ASTM C1396 [1] and is designed to be used as an interior sheathing capable of supporting an array finishes and demonstrating various performance characteristics. Per NSF PCR [6], gypsum board is the generic name for a family of sheet products consisting of a non-combustible core primarily of gypsum with paper facing [8]. Gypsum board is ubiquitous in its use and naming – also called wallboard, drywall, plaster board, sheet rock and gypsum panel. Conventional 5/8" (15.9 mm) Type X gypsum board, having additional fire rating characteristics, is used primarily in commercial applications. As calculated, the weighted average density of 5/8" Type X conventional gypsum board (MC 0%) was 10.4 kg/m², with a minimum and maximum density value of 9.9 and 11.0 kg/m², respectively (less than +/-10% variation). The substrates consist of a noncombustible water-resistant gypsum core, sandwiched between two layers of paper. Typically, gypsum boards are 4' wide and 8' length panels (4'x8') produced with a beveled edge and are compatible with most interior wall and ceiling applications. Gypsum board may be available in other lengths and can vary in thickness and fire rating properties depending on additive types. It should be noted that 5/8" Type X conventional gypsum board (type X core) does not cover 5/8" Mold and Moisture Resistant (MMR), including paper faced abuse resistant, paper faced impact resistant (fiberglass mesh reinforcement embedded in the core) and paper faced plaster base gypsum board.

1.2 PRODUCT STANDARD

Applicable product standards for gypsum board include:

- ASTM C11–18b *Standard terminology relating to gypsum and related building materials and systems.*
- ASTM C22 / C22M–00(15) *Standard Specification for Gypsum.*
- ASTM C473–17 *Standard Test Methods for Physical Testing of Gypsum Panel Products.*
- ASTM C1396 / C1396M–17- *Standard Specification for Gypsum Board.*
- ASTM D3273–16 *Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.*
- ASTM E84–19b *Standard Test Method for Surface Burning Characteristics of Building Materials.*
- ASTM E119–18ce1 *Standard Test Methods for Fire Tests of Building Construction and Materials.*
- ASTM E2921–16a *Standard practice for minimum criteria for comparing whole building LCAs for use with building codes, standards, and rating systems.*

2 DECLARED UNIT

The declared unit is 92.9 m² (1,000 square feet, 1 MSF) of $\frac{5}{8}$ " Type X conventional gypsum board (Table 1).

Table 1: Declared unit definition

Parameter	15.9mm $\frac{5}{8}$ " Type X conventional	Units
Declared unit	92.9	m ²
Mass	991	kg
Thickness	15.9	mm
Core type	Type X	n/a

3 MATERIAL CONTENT

Table 2 below presents the weighted average composition by input material for 92.9 m² (1 MSF) of $\frac{5}{8}$ " (15.9 mm) Type X conventional gypsum board as derived from the GA member facilities LCI data collection for the reference year 2017.

Table 2: Weighted average material content for 92.9 m² of 15.9 mm Type X conventional gypsum board

Inputs	Units	15.9 mm ($\frac{5}{8}$ ") Type X conventional
Natural gypsum ore	kg	359
FGD synthetic gypsum	kg	558
Post-consumer gypsum ¹⁾	kg	3.5
Facing paper	kg	19.2
Backing paper	kg	17.9
Starch	kg	3.8
Vermiculite	kg	0.55
Fiberglass	kg	2.65

Inputs	Units	15.9 mm ($\frac{5}{8}$ ") Type X conventional
Potash	kg	0.0041
Dextrose	kg	0.59
Dispersant	kg	1.63
Retarder	kg	0.22
Potassium Sulfate	kg	0.020
Clay, kaolin	kg	0.28
Boric Acid	kg	0.12
Foaming agent (soap)	kg	0.25
Ball mill accelerator, BMA	kg	2.4
Edge Paste	kg	0.20
Sodium Trimetaphosphate	kg	0.036
Shredded Paper	kg	0.029
Water	kg	610
Wet weight	kg	1461
<i>Final weight, with MC</i>	<i>kg</i>	<i>991</i>
Final MC	%	2.6%
<i>Final weight, with 0% MC</i>	<i>kg</i>	<i>964</i>

Note:

¹⁾ Post-consumer gypsum includes gypsum board on-site construction off-cuts and recovered gypsum material collected from demolition sites.

4 PRODUCT STAGE

For this EPD, the boundary is “cradle-to-gate” or the *Production stage*, which includes extraction of raw materials (cradle) through the manufacture of gypsum boards ready for shipment (gate). Downstream activity stages - Construction, Use, End-of-life, and Optional supplementary information beyond the system boundary - are excluded from the system boundary (Figure 1). Figure 2 illustrates the Production stage system boundary for the declared gypsum board product system.

Per ISO 21930, 7.1.7.2.1 [2], the system boundary with nature includes those technical processes that provide the material and energy inputs into the system and the subsequent manufacturing and transport processes up to the factory gate, as well as the processing of any waste arising from those processes

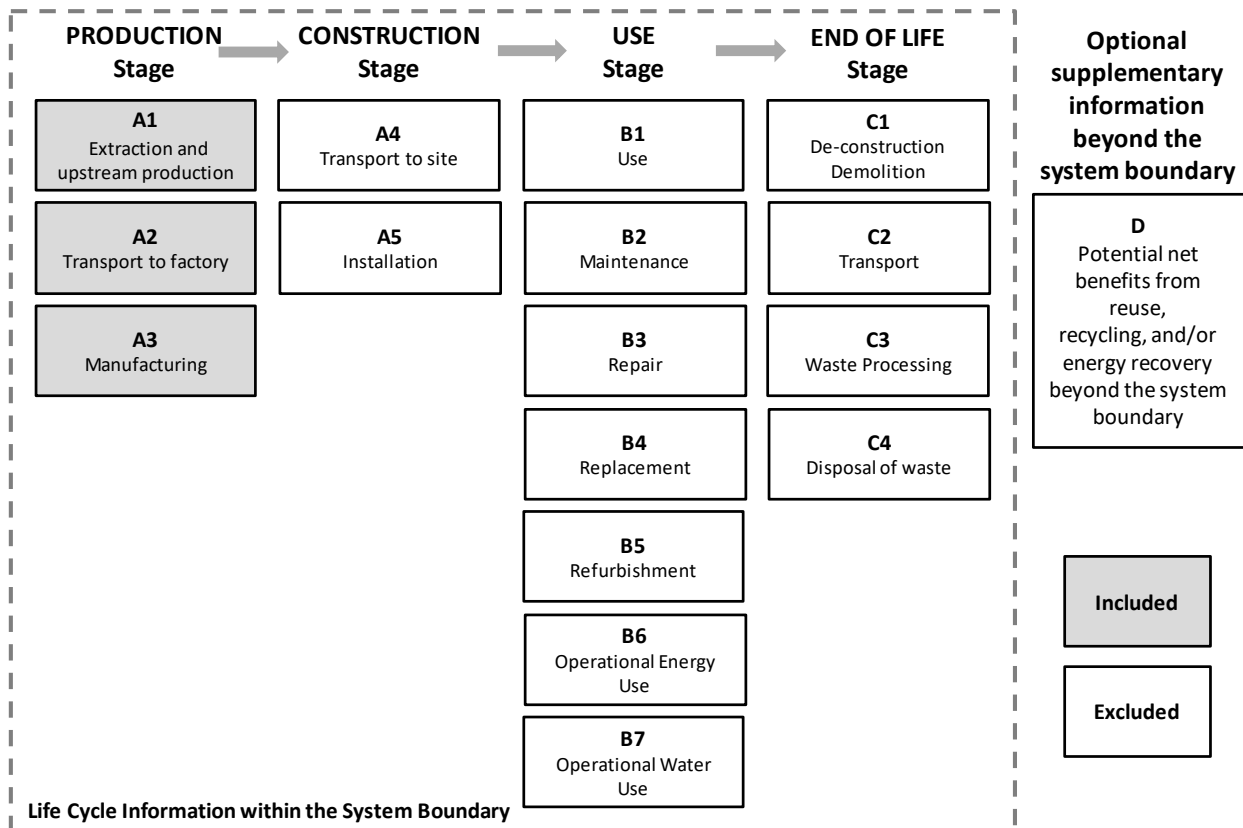


Figure 1 Common four life cycle stages and their information modules for construction products and the optional supplementary module [2]

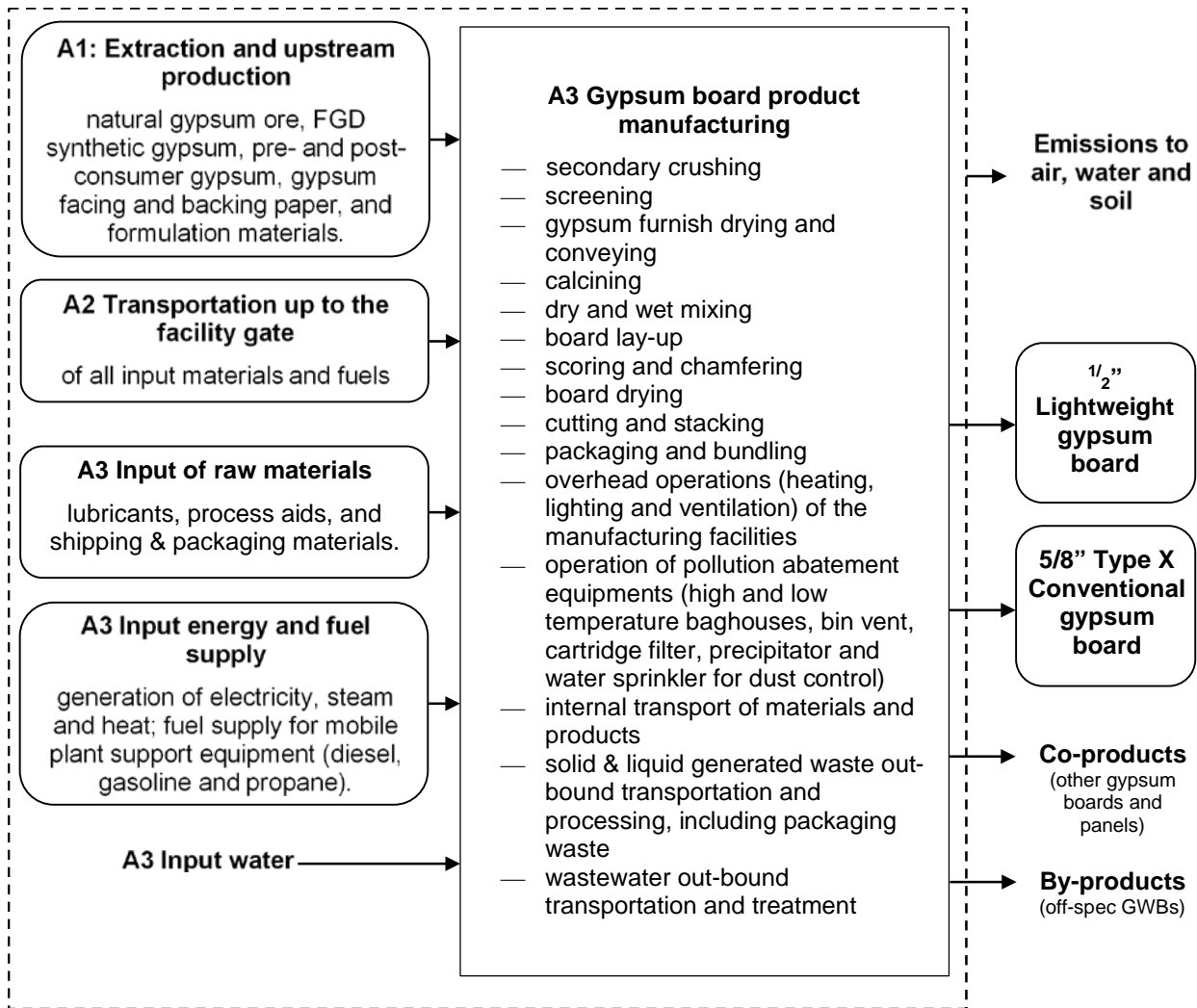


Figure 2 Production stage (modules A1 to A3) system boundary of gypsum board manufacturing

5 LIFE CYCLE INVENTORY

5.1 DATA COLLECTION, REPRESENTATIVENESS, SOURCES, AND CALCULATIONS

Data collection was based on an initial survey of all GA member facility operations. GA members operate 51 facilities in the USA and Canada producing various gypsum panel products. Some facilities are 100% dedicated to the production of gypsum boards while others may produce paper faced as well as other gypsum panel products. In total 17 facilities operated by the 7 GA company members (American Gypsum Company LLC, CertainTeed Gypsum, Inc., CertainTeed Gypsum Canada, Inc., Continental Building Products, Georgia-Pacific Gypsum LLC, National Gypsum Company, PABCO® Gypsum, United States Gypsum Company and CGC Inc.) completed LCI data collection questionnaires representing a third of all GA member facilities producing gypsum board. The gypsum board manufacturing plant study sample included all GA member companies and represented about 25% of all establishments producing gypsum and about 30% of all gypsum board produced in the N.A. To ensure representativeness, the gypsum board manufacturing plant study also considered the scale of operations including a mix of small, medium and large facilities, their geographical location in each US census region and their source of gypsum – adjacent quarry, mine, imported natural gypsum ore and their use of flue gas desulfurized (FGD) synthetic gypsum (both domestic and imported).

In addition, in the framework of this project, foreground gate-to-gate LCI data were collected for natural gypsum ore extraction (six quarries and one underground mining site) as well the manufacture of gypsum facing and backing papers (three plants) for the reference year 2017. LCI data collection was based on three customized LCI surveys for the GA natural gypsum ore extraction sites, gypsum paper production, and gypsum board manufacturing facilities. Source of data is specified as: *Direct*, based on measurements or purchasing/selling records of the surveyed facilities; *Indirect*, based on calculations made by the personnel of the surveyed facilities; and *Estimated*, based on the industry average data and/or expert judgment.

Per NSF PCR, Section 5.3 [6] and ISO 21930, 5.3 [2], all facility specific LCI data were weighted based on total annual production to calculate the weighted average LCI profile for the natural gypsum ore (in short ton), gypsum papers (per MSF) and gypsum boards (per MSF).

Data calculation procedures follow ISO 14044 [4], and NSF PCR for Gypsum Panel Products [6]. Per ISO 21930, 7.2.2 [2], when transforming the inputs and outputs of combustible material into inputs and outputs of energy, the net calorific value (lower heating value) of fuels is applied according to scientifically based and accepted values specific to the combustible material.

5.2 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

A detailed description of collected data and the data quality assessment regarding the NSF PCR requirements [5] and ISO 14044 [4] is provided in the LCA report. Data quality is assessed based on its representativeness (technology coverage, geographic coverage, time coverage), completeness, consistency, reproducibility, transparency and uncertainty (Table 3).

Table 3 Data Quality Requirements and Assessments

Data Quality Requirements	Description
Technology Coverage	Data represents the prevailing technology in use in U.S. and Canada. Whenever available, for all upstream and core material and processes, North American typical or average industry LCI datasets were utilized. <i>Technological representativeness is characterized as "high".</i>
Geographic Coverage	The geographic region considered is U.S. and Canada. The geographic coverage of all LCI databases and datasets is documented in the LCA report. <i>Geographical representativeness is characterized as "high".</i>
Time Coverage	Activity data are representative as of 2017. <ul style="list-style-type: none"> - Gypsum board manufacturing process- primary data collected from 17 facilities: reference year 2017 (12 months); - In-bound/ out-bound transportation data- primary data collected from 17 facilities: reference year 2017 (12 months); - Natural gypsum ore – primary data collected from six quarries and one gypsum ore underground mine: reference year 2017 (12 months); - Face and backing paper manufacturing- primary data collected from 3 facilities: reference year 2017 (12 months). - Generic data: North American and global LCI databases such as the U.S. National Renewable Energy Laboratory LCI database, September 2015 (http://www.nrel.gov/lci/), and ecoinvent 3.5, allocation, cut-off database, 2018 (http://www.ecoinvent.org/). Both are included in the LCA software SimaPro v.9.0.0.30, 2019. US LCI database "dummies" (empty/missing LCI datasets) are substituted with ecoinvent v3.5 LCI datasets. <i>Temporal representativeness is characterized as "high".</i>

Data Quality Requirements	Description
Completeness	<p>All relevant, specific processes, including inputs (raw materials, energy and ancillary materials) and outputs (emissions and production volume) were considered and modeled to provide an industry average for $\frac{5}{8}$" (15.9 mm) Type X conventional gypsum board.</p> <p>The completeness of the cradle-to-gate process chain in terms of process steps is rigorously assessed and documented in the LCA report.</p>
Consistency	<p>To ensure consistency, the LCI modeling of the production weighted input and output LCI data for the gypsum board product of interest used the same LCI modeling structure across the selected GA member facilities, which consisted of input raw, secondary, facing/backing, formulation, ancillary and packaging materials, energy flows, water resource inputs, product outputs, co-products, by-products, emissions to air, water and soil, and solid and liquid waste disposal. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the facility level and selected process levels to maintain a high level of consistency.</p>
Reproducibility	<p>Internal reproducibility is possible since the data and the models are stored and available in <i>GA Athena GB LCI database</i> developed in SimaPro, 2019. A high level of transparency is provided throughout the project report as the weighted average LCI profile is presented for each of the declared products as well as major upstream inputs. Key primary (manufacturer specific) and secondary (generic) LCI data sources are summarized in the LCA report. GA industry internal reproducibility is also possible as a high level of transparency is provided throughout the LCA report.</p>
Transparency	<p>Activity and LCI datasets are transparently disclosed in the project report, including data sources.</p>
Uncertainty	<p>A <i>sensitivity check</i> was conducted to assess the reliability of the EPD results and conclusions by determining how they are affected by uncertainties in the data or assumptions on calculation of LCIA and energy indicator results. The sensitivity check includes the results of the sensitivity analysis and Monte Carlo uncertainty analysis and is documented in the LCA report.</p>

5.3 ALLOCATION RULES

Per NSF PCR, Section 7.2.3 and 7.2.6 [6], allocation, if required, shall follow the requirements and guidance of ISO 14044:2006, Section 4.3.4 and shall be based on the mass of gypsum panel products produced. Allocation related to transport shall be based on the mass of the transported product.

The GA gypsum board manufacturing facilities produce other co-products besides selected gypsum boards and as such allocation based on the mass of gypsum board products was necessary. Per ISO 21930, 3 [2], co-product is defined as any of one or more products from the same unit process, but which is not the object of the assessment. As a result, plant specific generic formulations for 1 MSF (92.9 m²) of the two gypsum board products of interest were used to model and calculate the required input raw materials (both primary and secondary), facing/backing and formulation materials, and water input (see Table 2).

Per NSF PCR, Section 7.2.3 to 7.2.6 [6], “mass” was used as the physical parameter for allocating flows between the products of interest and other co-products to calculate the input energy flows (electricity, natural gas, propane, etc.), shipping and packaging materials, lubricants, hydraulic fluid, greases, and oils, total water consumption, process emissions to air, water and land and waste flows. Similarly, plant specific generic formulations for 1 MSF (92.9 m²) of gypsum paper and mass was used as the basis for allocating flows across products and co-products of gypsum paper manufacturing.

Per ISO 21930, 3 [2], by-product is defined as co-product from a process that is incidental or not intentionally produced and which cannot be avoided. No burden is allocated to any of the by-products of the selected product systems such as off-spec gypsum boards (used as dunnage/bunks/sleuters); side rolls (recycled back into the gypsum paper production, or sold out to other converters to make tubes and cores); downgraded rolls (used as paper fiber in the wallboard, or sold out to other converters to make tubes and cores), or other rocks from gypsum ore extraction sites (sold to other industries).

Per NSF PCR 7.1.7.2.5 and 7.2.3 [6], flue gas desulfurized synthetic gypsum is considered a recovered “waste” material and is used burden free; other than those burdens necessary to use it as an input in the manufacture of gypsum boards. FGD synthetic gypsum is a by-product of coal-fired power generation process – a result of SO₂ scrubbing of stack emissions enforced by the US EPA Clean Air Act– and a major raw material used in the production of gypsum board products [9], [10]. For FGD synthetic gypsum to be a saleable product for use in gypsum board manufacturing it needs to undergo de-watering process to reduce the moisture content to around 10% [10], [11], [12], and transport to the gypsum board manufacturing facility. As a result, the dewatering of sludge by vacuum filtration and transport of FGD synthetic gypsum is included within the Production stage system boundary [11], [12]. It should be mentioned that saleable FGD synthetic gypsum has the same molecular composition as raw gypsum [10]. Typically, FGD synthetic gypsum undergoes additional secondary drying at the GWB plant; this drying is included in the A3 Manufacturing information module. In addition, per NSF PCR, Section 7.2.3 to 7.2.6 [6], allocation related to transport is based on the mass of transported inputs and outputs.

5.4 CUT OFF RULES

The cut-off criteria as per NSF PCR, Section 7.1.6 [6] and ISO 21930, 7.1.8 [2], were followed for this EPD. Per ISO 21930, 7.1.8 [2], all input/output data required were collected and included in the LCI modelling. No substances with hazardous and toxic properties that pose a concern for human health and/or the environment were identified in the framework of this EPD. Any plant specific data gaps for the reference year 2017 e.g. input hydraulic fluids, lubricants, oils, or packaging materials were filled in with plant generic data from previous years or industry average data. Material Safety Data Sheet (MSDSs) are provided confidentially by GA plants per each chemical class e.g. sizing agents, retention chemicals, etc. Any data gaps in the MSDS are filled in with two generic LCI datasets, as appropriate (conservative assumptions): *Chemical, organic {GLO} | production | Cut-off, U; Chemical, inorganic {GLO} | production | Cut-off, U.*

Per NSF PCR, Section 7.1.6 [6], the Production Stage *excludes* the following processes:

- Capital goods and infrastructure;
- Human activity and personnel related activity (travel, furniture, office operations and supplies);
- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

6 LIFE CYCLE ASSESSMENT

6.1 RESULTS OF THE LIFE CYCLE ASSESSMENT

This section summarizes the product stage life cycle impact assessment (LCIA) results including resource use and waste generated metrics based on the cradle-to-gate life cycle inventory inputs and outputs analysis. The results are calculated based on 92.9 m² (1 MSF) of 15.9 mm ($\frac{5}{8}$ ") Type X conventional gypsum board. (Table 3). *It should be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks [3], [4].*

Per NSF PCR, Section 7.3 [6], the US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), version 2.1, 2012 impact categories are used as they provide a North American context for the mandatory category indicators to be included in this EPD. Per NSF PCR, Section 7.2.10, 7.2.13, 7.2.14 [6], the following mandatory resource use, waste categories and output flows are reported as described in Table 3.

Table 3 Product Stage (A1-A3) - EPD Results – 92.9 m² (1MSF) of 15.9 mm (5/8)" Type X conventional gypsum board

Impact categories and inventory indicators	Unit	A1, Extraction and upstream production	A2, Transport to factory	A3, Manufacturing	Total
Global warming potential, GWP 100 ¹⁾	kg CO ₂ eq	55.5	9.9	211.6	277
Ozone depletion potential, ODP ¹⁾	kg CFC-11 eq	6.0E-06	8.0E-10	2.8E-05	3.4E-05
Smog formation potential, SFP ¹⁾	kg O ₃ eq	2.91	3.71	5.15	11.8
Acidification potential, AP ¹⁾	kg SO ₂ eq	0.189	0.14	0.35	0.67
Eutrophication potential, EP ¹⁾	kg N eq	0.250	0.0079	0.34	0.60
Abiotic depletion potential, ADP surplus, TRACI ¹⁾	MJ surplus	97.6	19.9	457.4	575
ADP LHV, CML ²⁾	MJ LHV	697.1	134.4	3,014	3,845
Renewable primary energy carrier used as energy, RPR _E	MJ LHV	129.2	0	55	184
Renewable primary energy carrier used as material, RPR _M ³⁾	MJ LHV	0	0	0	0
Non-renewable primary energy carrier used as energy, NRPR _E	MJ LHV	770.8	135.8	3194	4,100
Non-Renewable primary energy carrier used as material, NRPR _M ³⁾	MJ LHV	0	0	0	0
Secondary material, SM ³⁾	kg	608	0	0	608
Renewable secondary fuel, RSF ³⁾	MJ LHV	0	0	0	0
Non-renewable secondary fuel, NRSF ³⁾	MJ LHV	0	0	0	0
Recovered energy, RE ³⁾	MJ LHV	0	0	0	0
Consumption of fresh water ³⁾	m ³	0.443	0	0.78	1.22
Hazardous waste disposed, HWD ³⁾	kg	0	0	0	0
Non-hazardous waste disposed, NHWD ³⁾	kg	4.7349	0	5.9	10.6
High-level radioactive waste, conditioned, to final repository, HLRW ³⁾	m ³	4.1E-08	1.3E-11	1.1E-07	1.5E-07
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW ³⁾	m ³	4.3E-07	1.0E-10	9.1E-07	1.3E-06
Components for re-use, CRU ³⁾	kg	0	0	0	0
Materials for recycling, MR ³⁾	kg	0	0	28.3	28.3

Impact categories and inventory indicators	Unit	A1, Extraction and upstream production	A2, Transport to factory	A3, Manufacturing	Total
Materials for energy recovery, MER ³⁾	kg	0	0	0	0
Recovered energy exported from the product system, EE ³⁾	MJ LHV	0	0	0	0

Notes to Table 3:

¹⁾ Calculated as per U.S EPA TRACI 2.1, v1.05, SimaPro v 9. GWP 100, excludes biogenic CO₂ removals and emissions associated with biobased products such as starch and dextrose (see Table 4 for details); 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5), TRACI 2.1, with AR5, v1.05 [13]. ADP surplus, TRACI v2.1 (also known as Fossil fuel depletion, FFD) is required in LEED V4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations [14].

²⁾ Calculated as per CML-IA Baseline V3.05, SimaPro v 9. ADP LHV, CML is also required in LEED V4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations [14].

³⁾ Calculated as per ACLCA ISO 21930 Guidance [15], respective sections 6.2 to 10.8.

Per NSF PCR, 7.2.7 [5], for the gypsum panel products, recycled raw materials used to produce paper are not counted as biogenic carbon whereas starch and dextrose are counted. Table 4 shows the cradle-to-gate biogenic CO₂ removals associated with bio-based products used in the gypsum board system.

Table 4 Production Stage (A1-A3), Biogenic CO₂ removals – 92.9 m² (1 MSF) of 5/8" Type X conventional

Inputs	Chemical formula	C-Content	Biogenic CO ₂ removals (in kg CO ₂ / MSF)
Starch	(C ₆ H ₁₀ O ₅) _n	44%	- 6.1 = -3.8 kg×0.44×44/12
Dextrose	C ₆ H ₁₂ O ₆	40%	- 1.4 =-(0.59+0.36) kg×0.40×44/12

Notes:

¹⁾ 44 and 12 is the molar mass of CO₂ and C (in g/mol), respectively.

²⁾ It includes the amount of dextrose that is applied directly to the board (not part of BMA, Table 2), and the amount of dextrose mixed with landplaster to produce BMA (also known as heat resistant accelerator, HRA). The weighted average amount of dextrose in BMA resulted to 15%.

6.2 INTERPRETATION

The cradle-to-gate manufacture of 92.9 m² of 15.9 mm (1 MSF of 5/8") Type X conventional gypsum board embodies about 4.3 GJ of primary energy (LHV) and emits in the order of 277 kg CO₂ eq of greenhouse gases. Over 95% of the total primary energy is derived from non-renewable primary energy resources. On-site energy use at the plant (*natural gas* and *purchased electricity*) and the *paper input* were the major contributing sources to total primary energy use. Figure 3 presents the impact assessment and energy indicator results for 92.9 m² (1 MSF) of 5/8" Type X conventional gypsum boards, by information module, percent contribution basis.

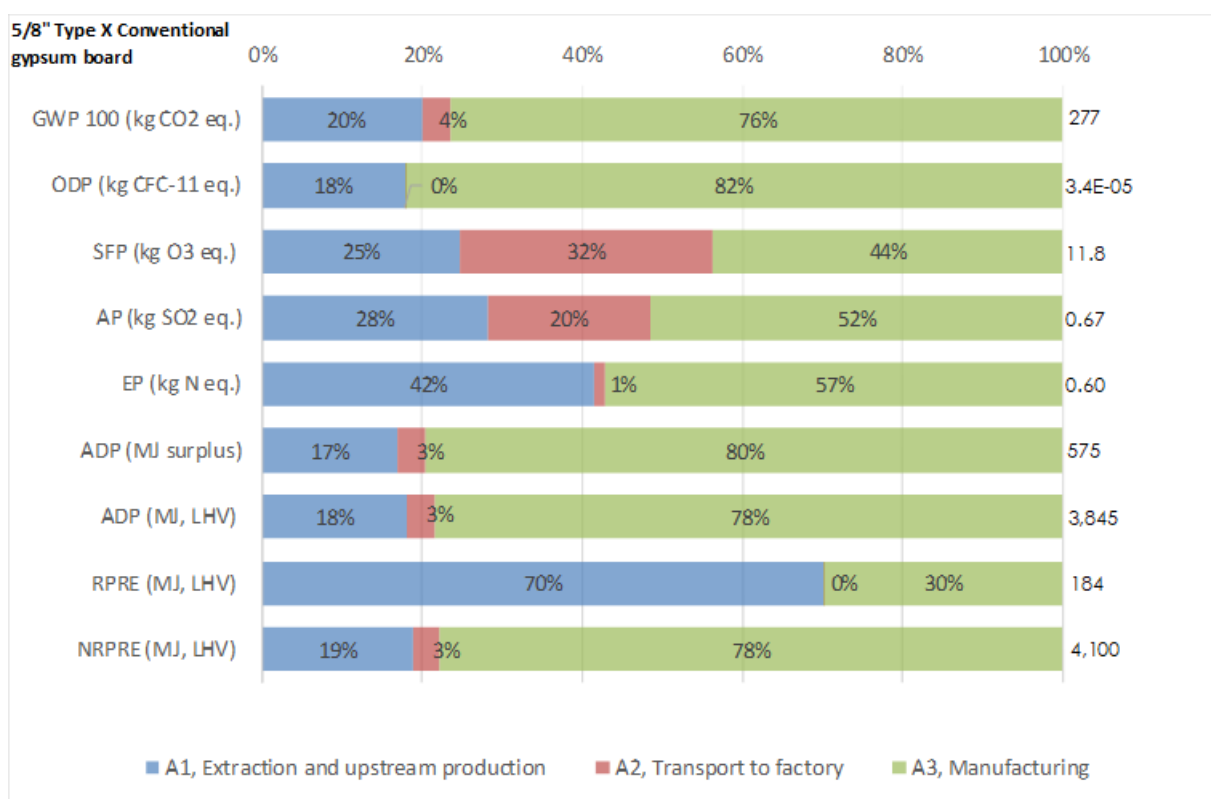


Figure 3 Impact assessment and energy indicator results by information module – 92.9 m² (1 MSF) of 15.9 mm (5/8") Type X conventional gypsum board – % Basis

Across the three-gypsum board production information modules, *Module A3 Manufacturing*, contributes the largest share of the LCIA and energy indicator results – accounting for between 44% (smog) and 82% (ozone depletion) of the potential environmental burdens. *Module A1*

Extraction and upstream production is the second largest contributor (<42%) to the overall potential environmental impacts of 1/2" Lightweight gypsum board manufacture. Except for acidification (20%) and smog potential impacts (32%), *Module A2 Transportation* is generally a minor contributor (<4%) to the overall impact of 5/8" Type X gypsum board manufacture.

The use of FGD synthetic gypsum and post-consumer paper is beneficial for the gypsum board industry as it reduces the dependency on primary material resources (natural gypsum ore and virgin paper stock).

7 ADDITIONAL ENVIRONMENTAL INFORMATION

- *Health Protection Manufacture*

The OSHA standards are applicable and followed.

- U.S. Department of Labor, Occupational Safety & Health Administration (OSHA), 29 CFR, PART 1910 Occupational Safety and Health Standards.

https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1910, accessed 15-04-2020.

No additional health protection measures extending beyond mandatory occupational safety measures for commercial operations are required.

- *Environmental Protection Manufacture and Equipment*

The GA member manufacturing facilities comply with the regional (US and Canadian) environmental protection requirements, monitor and report the emissions to air during the manufacturing process as per the following:

- EPCRA Section 313 Toxic Release Inventory Reporting (U.S)

https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1910, accessed 15-04-2020.

- The Canadian National Pollutant Release Inventory (NPRI) reporting

<http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=4A577BB9-1>, accessed 15-04-2020.

Pollution abatement equipment typically used in the gypsum board manufacturing facilities consist of high and low temperature baghouses, bin vent filter, cartridge filter, precipitator and water sprinklers for dust control.

8 DECLARATION TYPE AND PRODUCT AVERAGE DECLARATION

The type of EPD is defined as:

- A "Cradle-to-gate" EPD for 5/8" Type X conventional gypsum board covering the *Production stage* (information modules A1 to A3) and is intended for use in Business-to-Business communication.

This industry average EPD for 5/8" Type X conventional gypsum board (UNCPC Code 3699, NAICS Code 327420) falls under the description:

- *An average product EPD, as an average from several GA manufacturers' facilities (in this case, GA member manufacturers as listed under "GA Member Companies Corporate Locations", see General Summary section).*

9 DECLARATION COMPARABILITY LIMITATION STATEMENT

The following ISO 21930 statements indicate the EPD comparability limitations and intent to avoid any market distortions or misinterpretation of EPDs based on the NSF PCR for Gypsum Panel Products [6]:

- *Only EPDs prepared from cradle-to-grave life cycle results and based on the same function, RSL, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to comparison between products.*

10 EPD EXPLANATORY MATERIAL

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

NSF International

789 N. Dixboro, Ann Arbor, MI 48105

sustainability@nsf.org

11 REFERENCES

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16. Athena Sustainable Materials Institute 2020, *An Industry Average Cradle-to-Gate Life Cycle Assessment of 1/2" Lightweight and 5/8" Type X Conventional Gypsum Board for the USA and Canadian Markets, Final Report, Prepared for Gypsum Association. April 2020.*

HPD UNIQUE IDENTIFIER: 29885

CLASSIFICATION: 09 20 00 Plaster and Gypsum Board

PRODUCT DESCRIPTION: USG Sheetrock® Brand Firecode® X Gypsum Panels are composed of fire-resistant gypsum core encased in 100-percent recycled natural-finish face paper and 100-percent recycled liner paper on the back. These panels score and snap easily for quick installation of interior wall and ceiling applications, allowing painting, decorating and the installation of metal or wood almost immediately.

Section 1: Summary

Basic Method / Product Threshold

CONTENT INVENTORY

Inventory Reporting Format	Threshold Level	Residuals/Impurities Evaluation	For all contents above the threshold, the manufacturer has:
<input type="radio"/> Nested Materials Method	<input type="radio"/> 100 ppm	<input checked="" type="radio"/> Completed	Characterized <input checked="" type="radio"/> Yes <input type="radio"/> No
<input checked="" type="radio"/> Basic Method	<input checked="" type="radio"/> 1,000 ppm	<input type="radio"/> Partially Completed	Provided weight and role.
Threshold Disclosed Per	<input type="radio"/> Per GHS SDS	<input type="radio"/> Not Completed	Screened <input checked="" type="radio"/> Yes <input type="radio"/> No
<input type="radio"/> Material	<input type="radio"/> Other	Explanation(s) provided :	Provided screening results using HPDC-approved methods.
<input checked="" type="radio"/> Product		<input checked="" type="radio"/> Yes <input type="radio"/> No	Identified <input type="radio"/> Yes <input checked="" type="radio"/> No
			Provided name and CAS RN or other identifier.

CONTENT IN DESCENDING ORDER OF QUANTITY

Summary of product contents and results from screening individual chemical substances against HPD Priority Hazard Lists and the GreenScreen for Safer Chemicals®. The HPD does not assess whether using or handling this product will expose individuals to its chemical substances or any health risk. Refer to Section 2 for further details.

PRODUCT | MATERIAL OR SUBSTANCE | RESIDUAL OR IMPURITY

GREENSCREEN SCORE | HAZARD TYPE

SHEETROCK® BRAND FIRECODE® X PANELS [GYPSUM BM-3dg | CELLULOSE, MICROCRYSTALLINE LT-UNK | RES STARCH LT-UNK | SOLID GLASS AND GLASS / MINERAL FIBER (SEE VARIANTS) LT-UNK | UNDISCLOSED LT-UNK | NAPHTHALENESULFONIC ACID, FORMALDEHYDE POLYMER, CALCIUM SALT LT-P1 | POLYVINYL ACETATE (PVA) LT-UNK]

Number of Greenscreen BM-4/BM3 contents ... 1

Contents highest-concern GreenScreen score(s) (BM-1, LT-1, LT-P1) ... LT-P1

Nanomaterial ... No

INVENTORY AND SCREENING NOTES:

Residuals/Impurities in raw materials that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS are displayed in the HPD when greater than or equal to 1000 ppm. USG uses an outside lab to quantify potential impurities of raw materials. Analytical methods may include but are not limited to; x-ray diffraction, x-ray fluorescence, atomic absorption, ion chromatography, liquid chromatography, and crystalline silica analysis.

VOLATILE ORGANIC COMPOUND (VOC) CONTENT

VOC Content data is not applicable for this product category.

CERTIFICATIONS AND COMPLIANCE See Section 3 for additional listings.

VOC emissions: UL/GreenGuard Gold Certified

CONSISTENCY WITH OTHER PROGRAMS

Pre-checked for LEED v4 Option 1.

Pre-checked for LEED v4.1 Option 1.

Third Party Verified?	PREPARER: Self-Prepared	SCREENING DATE: 2022-09-14
<input type="radio"/> Yes	VERIFIER:	PUBLISHED DATE: 2022-09-14
<input checked="" type="radio"/> No	VERIFICATION #:	EXPIRY DATE: 2025-09-14

This section lists contents in a product based on specific threshold(s) and reports detailed health information including hazards. This HPD uses the inventory method indicated above, which is one of three possible methods:

- Basic Inventory method with Product-level threshold.
- Nested Material Inventory method with Product-level threshold
- Nested Material Inventory method with individual Material-level thresholds

Definitions and requirements for the three inventory methods and requirements for each data field can be found in the HPD Open Standard version 2.3, available on the HPDC website at: www.hpd-collaborative.org/hpd-2-3-standard

SHEETROCK® BRAND FIRECODE® X PANELS

PRODUCT THRESHOLD: 1000 ppm	RESIDUALS AND IMPURITIES EVALUATION COMPLETED: Yes
RESIDUALS AND IMPURITIES NOTES: Raw materials in this product may contain trace amounts of respirable crystalline silica. Testing has shown exposures to respirable crystalline silica are not expected to exceed the OSHA Permissible Exposure Level (PEL) during the normal use of this product. See the SDS on usg.com for occupational exposure information. No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS.	
OTHER PRODUCT NOTES: This product is made at Aliquippa, PA, Baltimore, MD, Bridgeport, AL, East Chicago, IN, Galena Park, TX, Hagersville, ON, Jacksonville, FL, Montreal, QC, Norfolk, VA, Plaster City, CA, Rainier, OR, Saint John, NB, Shoals, IN, Sigurd, UT, Sperry, IA, Sweetwater, TX, and Washingtonville, PA. Percent ranges displayed for this HPD are for all manufacturing plants that make this product and may vary.	

GYPSUM

ID: 13397-24-5

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:32		
%: 90.0000 - 95.0000	GreenScreen: BM-3dg	RC: PreC	NANO: No	SUBSTANCE ROLE: Structure component
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
	EC - CEPA DSL		Persistent	
ADDITIONAL LISTINGS	AGENCY		NOTIFICATION	
None found			No listings found on Additional Hazard Lists	
SUBSTANCE NOTES: No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS. This product contains 94.6% PreC recycled content. The use of FGD gypsum and the pre-consumer recycled content of Sheetrock® Brand Firecode® X Panels will vary by the manufacturing plant.				

CELLULOSE, MICROCRYSTALLINE

ID: 9004-34-6

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:33		
%: 3.0000 - 7.0000	GreenScreen: LT-UNK	RC: PostC	NANO: No	SUBSTANCE ROLE: Structure component
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
RES	AOEC - Asthmagens		Asthmagen (Rs) - sensitizer-induced	

ADDITIONAL LISTINGS	AGENCY	NOTIFICATION
EXEMPT	European Union / European Commission (EU EC)	EU - REACH Exemptions Exempted from REACH Annex IV listing due to intrinsic safety
POSITIVE LIST	US Environmental Protection Agency (US EPA)	US EPA - DfE SCIL Green Circle - Verified Low Concern
SUBSTANCE NOTES: No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS. This product contains 3.4% PostC recycled content.		

STARCH

ID: 9005-25-8

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:33		
%: 0.1000 - 0.5000	GreenScreen: LT-UNK	RC: None	NANO: No	SUBSTANCE ROLE: Binder
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
None found			No warnings found on HPD Priority Hazard Lists	
ADDITIONAL LISTINGS	AGENCY		NOTIFICATION	
EXEMPT	European Union / European Commission (EU EC)		EU - REACH Exemptions Exempted from REACH Annex IV listing due to intrinsic safety	
POSITIVE LIST	US Environmental Protection Agency (US EPA)		US EPA - DfE SCIL Green Circle - Verified Low Concern	
SUBSTANCE NOTES: No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS.				

SOLID GLASS AND GLASS / MINERAL FIBER (SEE VARIANTS)

ID: 65997-17-3

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:34		
%: 0.1000 - 0.5000	GreenScreen: LT-UNK	RC: None	NANO: No	SUBSTANCE ROLE: Tensile strength additive
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
	EC - CEPA DSL		Persistent	
ADDITIONAL LISTINGS	AGENCY		NOTIFICATION	
EXEMPT	European Union / European Commission (EU EC)		EU - REACH Exemptions Exempted from REACH Annex V listing due to intrinsic safety	
POSITIVE LIST	US Environmental Protection Agency (US EPA)		US EPA - DfE SCIL Green Circle - Verified Low Concern	

SUBSTANCE NOTES: As manufactured, continuous filament glass fibers in this product are not respirable. No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS.

UNDISCLOSED

ID: Undisclosed

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:34		
%: 0.0100 - 0.2000	GreenScreen: LT-UNK	RC: None	NANO: No	SUBSTANCE ROLE: Tensile strength additive
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
	EC - CEPA DSL		Persistent	
ADDITIONAL LISTINGS	AGENCY		NOTIFICATION	
None found		No listings found on Additional Hazard Lists		

SUBSTANCE NOTES: Proprietary ingredient. No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS. Not on the Living Future - Living Building Red List - Red List substances to avoid in Living Building Challenge v3 projects.

NAPHTHALENESULFONIC ACID, FORMALDEHYDE POLYMER, CALCIUM SALT

ID: 37293-74-6

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:35		
%: 0.0100 - 0.0700	GreenScreen: LT-P1	RC: None	NANO: No	SUBSTANCE ROLE: Dispersant
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
	EC - CEPA DSL		Persistent	
	EC - CEPA DSL		Bioaccumulative	
ADDITIONAL LISTINGS	AGENCY		NOTIFICATION	
RESTRICTED LIST	International Living Future Institute (ILFI)		Living Building Challenge 4.0 - Red List of Materials & Chemicals	
			Red List substances to avoid in Living Building Challenge V4.0 projects	

SUBSTANCE NOTES: USG has made an effort to decrease and will ultimately replace this dispersant. No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS.

POLYVINYL ACETATE (PVA)

ID: 9003-20-7

HAZARD DATA SOURCE: Pharos Chemical and Materials Library		HAZARD SCREENING DATE: 2022-09-14 10:26:36		
%: 0.0100 - 0.0500	GreenScreen: LT-UNK	RC: None	NANO: No	SUBSTANCE ROLE: Adhesive
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS	
	EC - CEPA DSL		Persistent	

ADDITIONAL LISTINGS	AGENCY	NOTIFICATION
None found		No listings found on Additional Hazard Lists

SUBSTANCE NOTES: No Residuals or Impurities are expected to be present at or above the 1000 ppm threshold that return a GreenScreen® score of BM-1, LT-1, LT-P1 or NoGS.

Section 3: Certifications and Compliance

This section lists applicable certification and standards compliance information for VOC emissions and VOC content. Other types of health or environmental performance testing or certifications completed for the product may be provided.

VOC EMISSIONS	UL/GreenGuard Gold Certified	
CERTIFYING PARTY: Third Party	ISSUE DATE: 2016-01-29	CERTIFIER OR LAB: UL
APPLICABLE FACILITIES: All	EXPIRY DATE:	Environment
CERTIFICATE URL: https://spot.ul.com/		
CERTIFICATION AND COMPLIANCE NOTES: Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment. Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m ³) fall in the range of 0.5 mg/m ³ or less, as specified in CDPH Standard Method v1.2.		

Section 4: Accessories

This section lists related products or materials that the manufacturer requires or recommends for installation (such as adhesives or fasteners), maintenance, cleaning, or operations. For information relating to the contents of these related products, refer to their applicable Health Product Declarations, if available.

USG SHEETROCK® OR BEADEX® BRAND FINISHING PRODUCTS

MANUFACTURER (OR GENERIC): USG

HPD URL: <https://www.usg.com>

ACCESSORY TYPE: Other

CONDITION WHEN RECOMMENDED OR REQUIRED AND/OR OTHER NOTES: For high-quality finishing results, USG recommends USG Sheetrock® or Beadex® Brand finishing products. Painting products and systems should be used that comply with recommendations and requirements in Appendices of ASTM C840. For priming and decorating with paint, texture or wall covering, follow manufacturer's directions for materials used. Gypsum Association's Recommended Specification for Levels of Gypsum Board Finish (GA-214) should be referred to in order to determine the level of finishing needed to ensure a surface properly prepared to accept the final decoration. For additional installation information, refer to product submittal sheet.

Section 5: General Notes

The International Agency for Research on Cancer (IARC) in June, 1987, categorized continuous filament glass fibers as not classifiable with respect to human carcinogenicity (Group 3). The evidence from human as well as animal studies was evaluated by IARC as insufficient to classify continuous filament glass fiber as a possible, probable, or confirmed cancer causing material.

MANUFACTURER INFORMATION

MANUFACTURER: **USG**
 ADDRESS: **550 West Adams St**
Chicago IL 60661, United States
 WEBSITE: **usg.com**

CONTACT NAME: **Stacy Simpson**
 TITLE: **Sustainability Manager**
 PHONE: **1-800-USG4YOU**
 EMAIL: **sustainability@usg.com**

The listed contact is responsible for the validity of this HPD and attests that it is accurate and complete to the best of his or her knowledge.

KEY

Hazard Types

AQU Aquatic toxicity	LAN Land toxicity	PHY Physical hazard (flammable or reactive)
CAN Cancer	MAM Mammalian/systemic/organ toxicity	REP Reproductive
DEV Developmental toxicity	MUL Multiple	RES Respiratory sensitization
END Endocrine activity	NEU Neurotoxicity	SKI Skin sensitization/irritation/corrosivity
EYE Eye irritation/corrosivity	NF Not found on Priority Hazard Lists	UNK Unknown
GEN Gene mutation	OZO Ozone depletion	
GLO Global warming	PBT Persistent, bioaccumulative, and toxic	

GreenScreen (GS)

BM-4 Benchmark 4 (prefer-safer chemical)	LT-P1 List Translator Possible 1 (Possible Benchmark-1)
BM-3 Benchmark 3 (use but still opportunity for improvement)	LT-1 List Translator 1 (Likely Benchmark-1)
BM-2 Benchmark 2 (use but search for safer substitutes)	LT-UNK List Translator Benchmark Unknown
BM-1 Benchmark 1 (avoid - chemical of high concern)	NoGS No GreenScreen.
BM-U Benchmark Unspecified (due to insufficient data)	

GreenScreen Benchmark scores sometimes also carry subscripts, which provide more context for how the score was determined. These are DG (data gap), TP (transformation product), and CoHC (chemical of high concern). For more information, see 2.2.2.4 GreenScreen® for Safer Chemicals, www.greenscreenchemicals.org, and Best Practices for Hazard Screening on the HPDC website (hpd-collaborative.org).

Recycled Types

PreC Pre-consumer recycled content
PostC Post-consumer recycled content
UNK Inclusion of recycled content is unknown
None Does not include recycled content

Other Terms:

GHS SDS Globally Harmonized System of Classification and Labeling of Chemicals Safety Data Sheet

Inventory Methods:

Nested Method / Material Threshold Substances listed within each material per threshold indicated per material
Nested Method / Product Threshold Substances listed within each material per threshold indicated per product
Basic Method / Product Threshold Substances listed individually per threshold indicated per product

Nano Composed of nano scale particles or nanotechnology

Third Party Verified Verification by independent certifier approved by HPDC

Preparer Third party preparer, if not self-prepared by manufacturer

Applicable facilities Manufacturing sites to which testing applies

The Health Product Declaration (HPD) Open Standard provides for the disclosure of product contents and potential associated human and environmental health hazards. Hazard associations are based on the HPD Priority Hazard Lists, the GreenScreen List Translator™, and when available, full GreenScreen® assessments. The HPD Open Standard v2.1 is not:

- *a method for the assessment of exposure or risk associated with product handling or use,*
- *a method for assessing potential health impacts of: (i) substances used or created during the manufacturing process or (ii) substances created after the product is delivered for end use.*

Information about life cycle, exposure and/or risk assessments performed on the product may be reported by the manufacturer in appropriate Notes sections, and/or, where applicable, in the Certifications section.

The HPD Open Standard was created and is supported by the Health Product Declaration Collaborative (the HPD Collaborative), a customer-led organization composed of stakeholders throughout the building industry that is committed to the continuous improvement of building products through transparency, openness, and innovation throughout the product supply chain.

The product manufacturer and any applicable independent verifier are solely responsible for the accuracy of statements and claims made in this HPD and for compliance with the HPD standard noted.

CERTIFICATE OF COMPLIANCE



USG

USG Sheetrock® Brand EcoSmart
Panels Firecode® X

80551-420

Certificate Number

06/18/2016 - 01/29/2022

Certificate Period

Certified

Status

UL 2818 - 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.



UL investigated representative samples of the identified Product(s) to the identified Standard(s) or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Certificate Holder (collectively "Agreement"). The Certificate Holder is authorized to use the UL Mark for the identified Product(s) manufactured at the production site(s) covered by the UL Test Report, in accordance with the terms of the Agreement. This Certificate is valid for the identified dates unless there is non-compliance with the Agreement.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC ^(A)	-	0.22	mg/m ³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m ³
Total Aldehydes ^(B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m ³
Particle Matter less than 10 µm ^(C)	-	20	µg/m ³
1-Methyl-2-pyrrolidinone ^(D)	872-50-4	160	µg/m ³
Individual VOCs ^(E)	-	1/2 CREL or 1/100th TLV	-

- (A) Defined to be the total response of measured VOCs falling within the C₆ – C₁₆ range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.
- (B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.
- (C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.
- (D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day
- (E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).





ABOUT USG

For 115 years, USG has been the leading manufacturer of building products and innovative solutions focused on helping our customers build the spaces where we live, work and play. We have expanded the boundaries of building science with products and systems that are safer, lighter, stronger and more sustainable.

We put customers at the center of every decision we make, and our products enable architects, contractors and installers to not only build better structures, but to build a better world.

While our innovative products shape building standards across the globe, we are also deeply committed to being a positive force in our local communities. Our 6,600 employees look to make a bigger impact in the places where we make and sell our products, and with the people who use them.

WE ARE:

- ▶ A North American leader in producing gypsum wallboard, joint compound and a vast array of related products for the commercial, residential, and repair and remodel construction market.
- ▶ A leader in manufacturing ceiling suspension systems and an innovator in premier acoustical panel and specialty ceiling systems.
- ▶ Active around the world through joint ventures, subsidiaries and partners with manufacturing and distribution facilities in the Americas, Asia, Australia, Asia Pacific and the Middle East.



PRESIDENT'S LETTER



We are the leading manufacturer of building products and innovative building solutions that enable our customers to create sustainable, inspirational and inviting spaces. Our commitment to corporate citizenship extends beyond our manufacturing lines to our employees, our communities and the environment around us.

Sustainability isn't a trend at USG, it's how we do business. From using recycled material in our products to our waste reclamation programs, we are committed to lowering the environmental footprint across our network. We are leading the way with innovative manufacturing processes that use less water, less carbon dioxide and significantly reduce transportation fossil fuels.

We're also improving the way we communicate our commitment to sustainability. We have a rigorous raw materials analysis process and are committed to providing more information to you. For example, our new Product Attribute Reports provide a comprehensive overview of the health and environmental impacts of our products.

During the past three years we've completed hundreds of Lean Six Sigma projects that reduced energy, materials and waste in many areas of our business. Our advanced manufacturing initiative uses next-generation equipment, automated processes and highly-trained people to produce better products more safely and efficiently.

In our communities, our employees are dedicated to improving the lives of people where we live and work around the world. We donate thousands of volunteer hours building homes, cleaning parks and serving our communities. In 2016, we received the prestigious Robert W. Campbell Award for our outstanding environmental, health, safety and sustainability programs. With our safety-first culture, our lost-time injury rate is 17 times better than the industry average.

Thank you for taking the time to learn more about our commitment to environmental, social and economic sustainability. We are pleased to share our progress on this journey and we hope for an even more sustainable future.

Sincerely,

A handwritten signature in black ink that reads "Jennifer F. Scanlon". The signature is fluid and cursive, with the first name being the most prominent.

Jennifer F. Scanlon
President and Chief Executive Officer

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Our identity serves as a signal to those who know us that USG is evolving in response to a rapidly changing world. The building blocks that make up our logo represent possibilities — shapes coming together to create something new.

A HOLISTIC APPROACH TO SUSTAINABILITY

Sustainable practices have been core to our business for 115 years. It's how we build a better world for our customers, employees and communities while caring for our business and the world around us. We take a holistic view of sustainability with an approach that encompasses three dimensions of responsibility — environmental, social and economic.

This report profiles our efforts and results in these three areas.



ENVIRONMENTAL **RESPONSIBILITY**



Ecoblueprint® is the strategy that guides our environmental sustainability efforts. We focus on three priorities that address the impacts most relevant to our customers, products and operations. We have made steady progress toward our three sustainability goals.



DEVELOP RESPONSIBLE CUSTOMER SOLUTIONS

Goal: By 2020, conduct life cycle assessments (LCAs) on 100 percent of our product portfolios.

Progress: Assessments completed for approximately 65 percent of our product portfolios, and additional LCAs will be completed this year.

ENHANCE ENERGY MANAGEMENT

Goal: By 2020, reduce greenhouse gas (GHG) emissions by 20 percent of our 2005 baseline.

Progress: We have reduced energy usage on a per unit of production basis by 15.7 percent resulting in a similar reduction in GHG emissions.

IMPROVE HOW WE USE RESOURCES

Goal: By 2020, 50 percent reduction in production waste to landfill compared to 2011 baseline.*

Progress: From 2011 to 2016 production waste to landfill has increased by 2% while manufacturing production has increased 43%.



*New baseline established in 2015 due to lack of historic information.

Sustainable Walls

INGREDIENTS

- ▶ Mined gypsum, one of the most plentiful and naturally fire-resistant minerals on earth, OR
- ▶ Flue Gas Desulfurization (FGD) gypsum, an environmentally friendly by-product of coal-fired power plants
- ▶ Starch made from corn, a rapidly renewable resource
- ▶ 100 percent recycled paper

LOW EMBODIED ENERGY

- ▶ Gypsum panels use less embodied energy than concrete, glass, vinyl flooring, plastics, steel and aluminum

LOW EMBODIED WATER

- ▶ Gypsum panels use less than two liters of water to produce one square foot of panel

LOW WASTE

- ▶ Nearly 100 percent of the raw materials used leave as finished product

LOCALLY SOURCED

- ▶ Extensive manufacturing and distribution network enables local sourcing to minimize transportation's environmental impact



Sustainable Ceilings

INGREDIENTS

- ▶ Mineral wool made from slag, an industrial byproduct from steel production
- ▶ Aluminum and steel suspension systems contain up to 90 percent recycled content

RECYCLING

- ▶ USG takes back approved ceiling panels, regardless of manufacturer, and recycles them into new ceiling panels



DEVELOP RESPONSIBLE CUSTOMER SOLUTIONS

Product Transparency

Our products are found in homes, schools and offices where children and adults live, learn and work. 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. 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.

We have a long standing commitment to openly share with our customers the essential information they need to confidently specify and use our products. From our USG Design Studio LEED Report tool to Environmental Product Declarations and certifications, we're committed to transparent manufacturing and product data.

More than 200 of our wallboard, ceiling tile and joint treatment products have earned UL (Underwriters Laboratories) Environment's GREENGUARD Gold certification. GREENGUARD Gold certification meets the country's strictest requirements for low-emitting products and ensures that a product is acceptable for use in environments such as schools and healthcare facilities.



In 2016, we became the first manufacturer to join the Architecture 2030 Challenge for Products for wallboard products. The 2030 Challenge calls on the global architecture, planning, design, and building community to design with and specify products manufactured with a carbon footprint 35 percent below the product average, incrementally increasing the reduction to 50 percent by 2030. We first joined Architecture 2030, a non-profit, in 2013 when we committed to meeting the 2030 Challenge for our ceilings portfolio.

To help demonstrate our commitment to meeting the ceilings challenge, we have developed Environmental Product Declarations (EPD) for 30 of our ceilings products. An EPD is an internationally standardized, comprehensive report used to quantify the environmental impact of a product or system. Third party organizations, such as UL Environment, certify EPDs. EPDs provide building owners, architects and sustainability professionals with vital environmental impact information addressing energy consumption, water use, waste, air emissions and other metrics related to the product lifecycle.





The Nation's First Public Safety Building Designed to Achieve Net-Zero Energy Balance

The Salt Lake City Public Safety Building balances stunning design with the high strength performance necessary to house the city's fire department, police department and emergency operations center. Beyond the balance of beauty and strength, the building was also designed to achieve a net-zero energy balance.

With a focus on sustainable building products, contractors chose USG Durock™ Brand EcoCap™ Self-Leveling Underlayment as a tile substrate for several key areas of the new building. We introduced EcoCap™ in 2013. It is the most environmentally friendly self-leveling product available. EcoCap™ uses proprietary USG technology to create a highly sustainable cementitious underlayment made primarily from an industrial by-product of coal combustion and sand. EcoCap™ is made with high-recycled content and reduces the carbon footprint by 50 percent compared to conventional floor prep products. It also requires fewer natural resources such as water for mixing.

Besides developing our own EPDs, we worked closely with the Gypsum Association in 2016 to develop an industry-wide EPD for North American Glass Mat Gypsum Panels. Previously we worked with the Association to develop an EPD for typical 5/8" type X North American gypsum boards. Additionally as part of our membership in the Ceilings & Interior Systems Construction Association, we produced EPDs for aluminum and steel specialty products including ceiling and wall systems, trims, column covers and associated suspension elements.

Life cycle assessments, or LCAs, form the basis of EPD. LCAs analyze all of a product's impacts on the environment throughout its entire lifecycle. We are working toward completing LCAs on 100 percent of our products, and we believe this end-to-end focus is essential to reducing our overall environmental impact.



We have committed to reducing the carbon-equivalent footprint of our ceiling products by

40%

below the product category average by 2020.

Increasingly, industry guidelines such as US Green Building Council's LEED v4 now require applicants to also report the impact of building materials on human health. We are a member of the Health Product Declaration Collaborative® (HPDC) which developed the Health Product Declaration® (HPD), a standardized document that lists a product's ingredients and related health information. We have published 31 USG wallboard and ceiling HPDs in the HPD Public Repository.

We have also developed Product Attribute Report (PAR) documents that summarize both the environmental and health impacts of a product. These reports combine sustainability data, regional materials and recycled content information, EPD data, and health product transparency information. We published 31 PARs for USG wallboard and ceiling panels in 2016 and have more in development.

Another product transparency initiative we completed was to redesign all our packaging to meet the Globally Harmonized System (GHS) of Classification and Labeling standards. GHS was a new initiative adopted by the US Occupational Safety and Health Administration to standardize the way manufacturers classify and label chemicals and raw materials. It provides common language and pictograms to help customers understand which raw materials are in products and how those materials might affect them.

New Products

We always strive to solve our industry's toughest challenges, and as demand for sustainable products continues to grow, architects and builders are looking to manufacturers to take the next step in lowering our environmental footprint. That's why we have developed some of the industry's most forward-thinking, environmentally friendly building innovations with products that are easier and safer to use, that reduce waste and improve efficiency — all without compromising design quality and performance.

With USG Sheetrock® Brand's new EcoSmart Panels, we have introduced the first wallboard available to meet the Architecture 2030 Challenge for Products with a lower carbon footprint. USG Sheetrock® Brand EcoSmart Panels represent a revolution in wallboard manufacturing and are the industry's first and only wallboard that is both lightweight and sustainable. These panels are built upon USG's UltraLight technology that contractors prefer but are now manufactured with fewer natural resources and reduced impact on the environment.

USG Sheetrock® Brand EcoSmart Panels use 25 percent less water to manufacture, reduce associated greenhouse gas emissions by 20 percent and lessen the carbon footprint of transportation energy by 20 percent compared to standard 5/8 inch Type X gypsum panels¹. These are impressive numbers on their own, but in aggregate they become even more astounding. In fact, an industry-wide conversion to USG Sheetrock® Brand EcoSmart Panels could save over 1.7 billion gallons of water, reduce CO₂ emissions by over 2.8 billion pounds and save 5.5 million gallons of diesel transportation fuel annually.



1. As presented in the Gypsum Association's 5/8 inch Type X Environmental Product Declaration (FPI/GA/01/2014) with fresh water usage updated to be in accordance with ISO 14046.

SUSTAINABLE PRODUCT TRANSPORTATION

We are committed to sustainably transporting our products. We have been a member of the Environmental Protection Agency's (EPA) SmartWaySM Transport Partnership program since 2006. The program promotes environmentally cleaner and more fuel efficient transportation options to improve air quality and reduce fuel consumption.



We collaborated with Tremco Commercial Sealants & Waterproofing on another sustainable product innovation, the Securock[®] ExoAir[®] 430 System. This first-of-its-kind system improves the energy efficiency of buildings by combining our Securock[®] Brand Glass-Mat Sheathing with Tremco's fluid applied air/water barrier membrane. BuildingGreen named Securock[®] ExoAir[®] 430 System one of its Top 10 Green Building Products for 2017 and the system was also recognized as an Edison Awards[™] Silver award winner in the Energy & Sustainability category for Building Construction & Lighting Innovations.

The system applies the membrane in the controlled manufacturing setting, a significant advantage over traditional air and water membranes, which are applied on the job site. With the Securock[®] ExoAir[®] 430 System, there are no tapes or pails of fluid to transport or dispose. Additionally, the three key system components, USG Securock[®] Brand Glass mat sheathing gypsum wallboard, Tremco's ExoAir[®] Fluid Membrane and Dymonic[®] 100 Sealant, have all been certified GREENGUARD Gold. Because the system protects structures from air, water and vapor it also reduces occupant heating and cooling costs.

ENHANCE ENERGY MANAGEMENT

Since our 2005 baseline, we have reduced energy consumption by a combined 15.7 percent on a per unit of production basis across our product lines. This has led to a similar reduction in greenhouse gas emissions during the same time period.

While our products are already low in embodied energy compared to other building materials, we are always looking to improve. We have found opportunities to consume less energy through increased use of alternative low-carbon energy sources, converting to cleaner burning fuels such as natural gas, and through consistent review and optimization of our manufacturing processes and equipment. Each of our plants has an energy coordinator whose job includes monitoring usage and looking for reduction opportunities.



Plant Honored for Energy Conservation

Our Sperry, Iowa plant was recognized at the annual Alliant Energy Conference for upgrading their lighting system to high efficiency bulbs, making work areas brighter and safer while using much less energy.

Weekend Shut Downs Lead to Significant Energy Savings

Since 2009, our Norfolk, Virginia wallboard plant has reduced energy use by completing a comprehensive shutdown checklist for weekends when the equipment isn't running. The plant first identified switches, panels and other equipment that were non-essential on the weekend and turned those items off. Next, they installed a smaller air compressor to support only the plant's fire suppression system, which allowed them to turn off main compressors. These two changes led to an immediate and significant reduction in energy demands. Last year, the plant added a power-monitoring screen to their process control system, which allows them to see exactly where energy is being used — and make adjustments as needed.

This year-round focus on weekend energy use evolved from our annual Kill-A-Watt contest in which participating plants compete to see how much they can reduce their weekend energy demands during the Thanksgiving holiday weekend.

Several plants have found great success through the contest, including Bridgeport, Alabama, which has consistently maintained a weekend energy consumption rate of less than five percent of its normal weekday demands.

At our Red Wing, Minnesota plant, we completed a project to reduce the energy required to manufacture our mineral wool ceiling tiles by more than 20 percent. Mineral wool is made from slag, a waste byproduct from steel production. Our ceiling tile plants use foundry coke as a fuel source to melt the slag which is then spun into fibers.

Red Wing changed its coke combustion process to significantly reduce the amount of waste energy generated. The plant expects further energy savings as it continues to optimize the new process and our colleagues will explore the feasibility of making similar changes at our Walworth, Wisconsin plant.

Red Wing's coke optimization project was one of several hundred Lean Six Sigma (LSS) projects we have completed in recent years to drive continuous improvement of our processes, equipment design and how we use resources. Many of these projects focused on reducing energy and optimizing raw materials, reducing time needed to start up machines in board plants and papers mills, increasing compressed air efficiencies by improving machine reliability and optimizing temperatures for raw materials.

IMPROVE HOW WE USE RESOURCES

During manufacturing, we continuously strive to use the least amount of resources needed while maintaining superior quality. For example, we applied LSS to improve how we use a chemical compound that increases the water resistance of popular USG products including FIBEROCK® Brand Underlayment and SECUROCK® Brand Gypsum-Fiber Roof Board. Over the years, this compound replaced wax as the primary ingredient to create moisture resistance. The wax replacement resulted in dust issues and energy inefficiencies. A LSS team that represented our Corporate Innovation Center, Technical Services and Manufacturing divisions developed several solutions that helped our Gypsum, Ohio plant reduce the chemical's usage by 40 percent. The LSS team adjusted the chemical to water ratio, how the chemical was fed through pumps and the amount of energy needed. Equipment re-designs and process changes further reduced the amount of dust generated. The plant now uses less natural gas and equipment lasts longer.



CENTER FOR MANUFACTURING EXCELLENCE

As part of our quest to run a more efficient and effective business, we established the Center for Manufacturing Excellence at our East Chicago, Indiana plant to pilot “next generation” manufacturing strategies.

These advanced controls provide real-time production data to reduce waste, downtime, energy and effort, and will enable us to produce higher quality products faster, safer and at a lower cost.



USG Participates in Wallboard Recycling Project

Our Washingtonville, Pennsylvania plant is recycling clean wallboard scrap from New York City job sites as part of a pilot program developed by the Durst Organization and Lend Lease, in partnership with the New School and the City University of New York. The normal cutting and use of wallboard in a construction projects typically creates about 10 to 12 percent excess product. Some of this waste is reused for agricultural purposes, but much of it ends up in landfills.

We are working with the City of New York and industry stakeholders to develop a much needed closed-loop wallboard recycling model that segregates clean wallboard waste from other job site waste and then hauls it away separately. Such actions drastically increase the recyclability of the gypsum and improve the recyclability of the other waste materials as well.

We are also conscious of reducing or eliminating waste from our processes. For example, we use 100 percent recycled paper on our wallboard products, and nearly 100 percent of the raw materials used during gypsum panel production leave as finished product. To expand this commitment to our customers and communities, some of our locations have increased the percentage of recycled content in our wallboard through waste reclamation efforts.

In addition to recycling the plant's own board waste, our Rainier, Oregon plant has a new waste reclamation system that turns job site wallboard waste back into gypsum panels. When new wallboard waste comes into the plant, a machine separates the gypsum core from the paper. The paper is sent to a local dairy farm where it's used as bedding, and the recovered gypsum is put back into our manufacturing process to be recycled into new wallboard. The new system allows us to meet increased customer demand for products higher in post-consumer recycled content.

We are constantly monitoring our waste streams and our ability to recycle our raw materials, products and other supplies. We're exploring ways to reuse ancillary items in our processes, including plastics, steel, paper and pallets.

Responsible Mining

We operate 12 mining operations in North America, including three underground mines and 9 surface quarries. Two of our quarries use surface mining machines to extract and sort gypsum rock through a single process, eliminating the conventional steps of drilling, blasting and crushing the rock. Eliminating these processes dramatically improves the energy efficiency of the mining operation.

Gypsum is a plentiful mineral, and mining gypsum is easier on the environment than other types of mining. We continuously evaluate our mining practices to reduce our impact on the environment and the communities around our mines.

Just one example of our commitment to responsible practices is our progressive reclamation of mining sites to promote vegetation, slope stability and animal habitats.

Our efforts help us in our goal to consistently and substantially exceed all state and federal requirements.

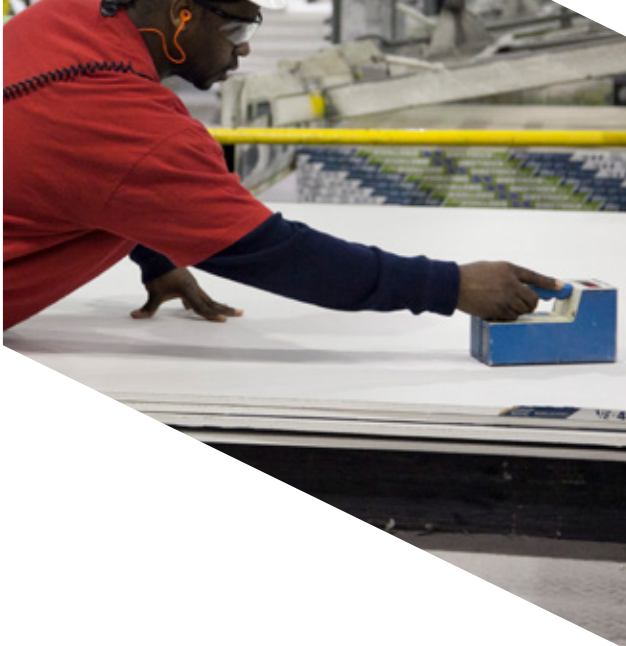
As part of our ongoing reforestation activities at our Tecomán, Mexico quarry, we recently completed backfilling and earthwork, and re-planted 3,200 native trees to return a two acre site to almost pre-mining condition. Over the next four years, we will plant 25,000 more trees and plants as we reclaim another 15 acres of land.

In Alabaster, Michigan our ongoing projects to restore and improve wildlife habitat on company property have included wetland creation and enhancement, timber management, deer management and control of invasive species.

Our goal is to return the land of our former mining sites to a productive state. In Locust Cove, Virginia where we mined gypsum for almost 40 years, the site now consists of hills and meadows inhabited by deer, turkey, black bears, beavers and other wildlife.



SOCIAL RESPONSIBILITY



SAFETY FIRST

SAFETY VISION

We will be the industry leader in health and safety by creating an injury-free workplace and modeling safe behaviors for our families, colleagues, customers and communities. We are committed to working safely: every minute, every task, every day — so we can live life to the fullest with those who depend on us.



USG accepts the Robert W. Campbell Award.

We value the safety of our employees above everything else and believe no job is so urgent that it cannot be done safely. More than half of our manufacturing operations have surpassed one million hours without a lost time injury.

The National Safety Council (NSC) honored our safety-first culture with its prestigious 2016 Robert W. Campbell Award, presented annually to an organization that achieves excellence through the integration of environmental, health, safety and sustainability management into business operations. Cutting across international and industry boundaries, Campbell Award winners represent organizations that have taken great strides in EHS excellence. Award winners are acknowledged not only as leaders in the business realm, but also as those that recognize the value of protecting employees and their environment.

In the history of the award, we are one of only a few to receive the Campbell Award as a first time applicant. The NSC presented us with the award at the National Safety Council Congress & Expo, the world's largest annual gathering of safety and health professionals. "USG truly has a culture of safety excellence," said Deborah A.P. Hersman, president and CEO of the National Safety Council. "The company-wide dedication to safety is clear, and we are excited to honor their commitment to saving lives and preventing injuries."

Our Canadian subsidiary, CGC Inc. was recognized by *Canadian Occupational Safety* magazine as a winner in the manufacturing category of Canada's 2016 Safest Employers Awards. The magazine evaluates honorees on a range of occupational health and safety elements including employee training, OHS management systems, emergency preparedness, incident investigation and innovation through health and safety initiatives.

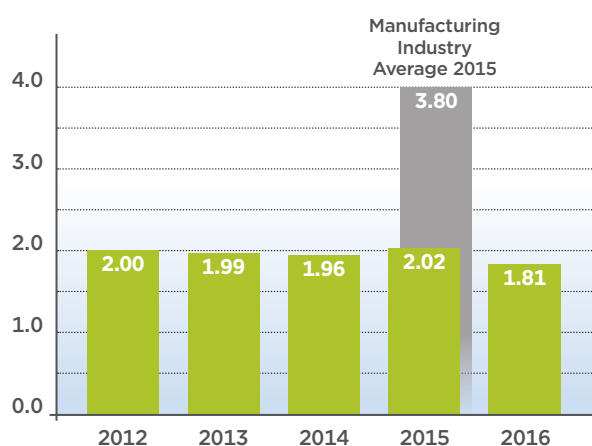
These honors were in addition to *EHS Today* magazine naming USG to its 2015 list of America's Safest Companies. The award honored just 16 top companies across a variety of industries that have accomplished ambitious safety goals and achieved injury and illness rates lower than average.

"What we've been hearing from experts is that in order for workplaces to achieve world-class safety, they must look beyond concepts like 'zero injuries' and look toward creating a culture that aligns business and safety," said *EHS Today* Editor-in-Chief Sandy Smith when she announced the list.

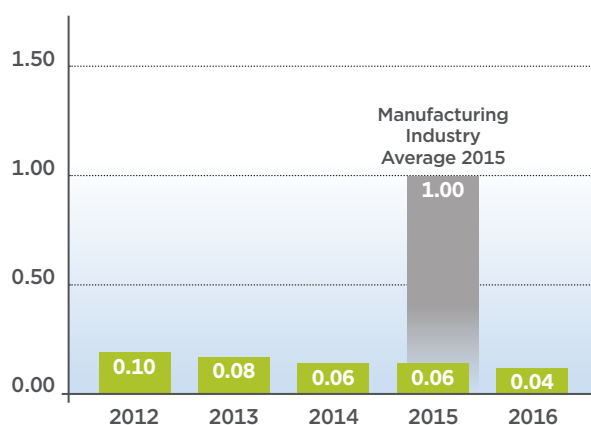
In 2016, our recordable injury rate was 1.81 per 100 employees and was significantly lower than the Manufacturing Recordable Injury Industry Average of 3.8 per 100 employees (according to data from the US Bureau of Labor Statistics). Our lost time rate of 0.04 was also lower than the 1.0 industry average (in 2015).

Injuries are not our only focus. We encourage our teams to report near misses too, so we can identify opportunities to reduce risk. By analyzing these incidents, we are able to implement effective corrective and preventative actions before an injury occurs. We consider safety everyone's responsibility, which means that each of our employees actively identifies hazards and develops plans to address those issues.

RECORDABLE INJURIES



LOST TIME INJURIES



USG Names Jennifer Scanlon President and CEO

Jennifer F. Scanlon became president and CEO of USG Corporation on November 1, 2016. She joined USG in 2003 and has held a number of leadership positions including serving as executive vice president, president of USG Corporation's International business, and president of L&W Supply Corporation (sold in 2016). "This is an important time in USG's history. We are a leading manufacturer of innovative products, and we're ready for the future," she said. Jennifer was a 2015 Women in Manufacturing STEP (Science, Technology, Engineering and Production) Ahead Award honoree. She is not only a sought-after thought leader on global manufacturing and building technologies in the U.S. and around the world, but also on the value of diversity and inclusion in the workplace.



"We engage our employees' heads, hearts and hands in our safety program, recognizing that they are closest to the hazards each day," explains Justin Dugas, director, Safety and Health. "Employees do not look to managers or supervisors to tell them how to safely do their jobs. They tell us. By listening to their ideas and concerns, we improve the safety of our operations."

Many of our locations achieved significant safety milestones in the past two years. Our Galena Park, Texas employees recorded 10,000 safe days, employees in Stockton, California reached 8,000, Little Narrows, Nova Scotia employees worked 7,000 safe days, our colleagues in Chamblee, Georgia reached 4,000 safe days and in Hagersville, Ontario employees achieved 2,000 safe days.

BUILDING A GREAT PLACE TO WORK

Our safety culture is just one of many ways we put our people and our values at the center of everything we do. Our colleagues create the high performance technologies and building systems that our customers use around the world, and we're committed to being a great place to work for great employees.

We are proud to be a leading employer, including recognition from the *Chicago Tribune* and the *Detroit Free Press* (three consecutive years). The rankings compiled by Workplace Dynamics, LLP, an independent research company specializing in organizational health, are based on the results of a nationwide survey of employee feedback on factors including company leadership, communication, career opportunities, working environment, managerial skills, pay and benefits.

We have always known that our greatest strength is the experience, talent and diversity of our teams. Diversity is one of our core values, and we're working toward an even more diverse and inclusive environment. Our Diversity and

44%

of our top 250 leaders are diverse

55%

of full-time salaried hires are diverse

50%

of recent promotions were diverse candidates

As of 2015

Claire Yu Honored as “The Best of the Best Women in Manufacturing”

The Manufacturing Institute honored Claire Yu, program manager of our Corporate Innovation Center’s ceilings laboratory, as one of its annual Women in Manufacturing STEP (Science, Technology, Engineering and Production) Ahead Award winners. Claire was one of a select group of women nationwide identified as “the best of the best women in the manufacturing industry.”

“These women are the faces of exciting careers in manufacturing,” said Jennifer McNelly, executive director of The Manufacturing Institute. “They each made significant achievements in manufacturing through positive impact on their company and the industry as a whole.”

Claire leads a team of researchers at our Corporate Innovation Center in Libertyville, Illinois. Whether mentoring junior level colleagues, especially women in STEM, or presenting complex research projects to executive leadership, Claire is a respected leader and visionary.



Women in Manufacturing Forum

Our Corporate Innovation Center recently hosted more than 40 engineers from 25 of our plants at our fourth annual Women in Manufacturing Forum. The two-day Forum provides an opportunity for attendees to network, discuss critical issues that affect female engineers and share best practices. Attendees include project engineers, process engineers, Lean Six Sigma black belts, department managers and plant managers.



8

Employee Resource Groups

- ▶ African American Network
- ▶ Asian Employee Network
- ▶ Defend the Rock (Military ERG)
- ▶ Latino Employee Network
- ▶ USG New Talent
- ▶ WomenRock!
- ▶ USG LGBTA
- ▶ USG Disabilities

Inclusion Strategy Council (DISC), formed nearly two decades ago, includes employees at every level from throughout our company. DISC provides strategic direction for our inclusion efforts.

We also have eight Employee Resource Groups (ERGs) that help create a sense of community and belonging for our colleagues, encouraging them to be their unique selves while teaching others about appreciating our differences.

We added two ERGs in 2016: USG Lesbian, Gay, Bisexual, Transgendered and Allies (USG LGBTA) and USG Disabilities. Both ERGs assist us to attract and retain employees. In addition, USG Disabilities supports employees who have family members with disabilities and works to raise awareness, address issues and dispel myths about disabilities. USG LGBTA is dedicated to empowering employees to bring their authentic selves to work by promoting pride and unity in the workplace, marketplace and community.

BUILDING BETTER COMMUNITIES

We are committed to being a good citizen in the communities where we do business, and to supporting the people and businesses who call these communities home. We are proud of our long history of involvement and partnerships with nonprofits that build and provide affordable housing, improve and beautify their surroundings and help neighbors meet basic needs.

One of these longstanding relationships is with AEC Cares, an annual volunteer event hosted in conjunction with the American Institute of Architect's annual conference. Each year, industry professionals gather the day before the convention for a one-day blitz build to benefit the convention's host community. In 2016, our employees joined fellow industry volunteers to refurbish an athletic recreation center, creating an inviting space for the children and adults of an underserved community in Philadelphia.





For years, our local teams have volunteered at Habitat for Humanity (HFH) events across North America and the USG Foundation has provided financial support for HFH homes. Volunteers from our Calgary plant joined their local HFH chapter to build homes for two deserving families. At another build, a dozen volunteers from the USG New Talent ERG installed USG Sheetrock® Brand UltraLight and Mold Tough® Panels in a HFH home in North Chicago, Illinois. These events allow us to give back to our community, with the added bonus of giving our employees hands-on experience with USG products.

Food and Diaper Drives Collect Much Needed Goods

Our local employees across North America support their communities in a variety of ways, but one of our most successful events is the company-wide food drive that combines the strength of all our locations. In 2016, we collected 122,000 pounds of non-perishable food to support community food banks. Over the last 3 years we have donated more than 300,000 meals to our neighbors in need. Each location worked with their local food bank to ensure donations remained in their community.

In Chicago, our African American Network and WomenRock ERGs organized a diaper drive to support NewMoms, Inc., a non-profit that supports homeless teenage mothers. The drive collected more than 14,000 diapers — almost a full year's supply for NewMoms.

The American Red Cross is another one of our long-term partners. Each year we provide significant financial support for ongoing operations and one-time donations for specific disaster relief efforts, as well as numerous hours of volunteer service. In 2016, we supported disaster relief and recovery efforts that followed Hurricane Matthew in October and flooding in Louisiana in August.

We encourage our teams to pursue volunteer opportunities that they're passionate about, such as veterans issues. Members of our Defend the Rock military ERG teamed up to build a new home in Knoxville, Tennessee as part of Helping a Hero's Wounded Hero Home Program. USG donated more than 400 sheets of wallboard and other USG products for use in a wounded veteran's new home. Our Sweetwater, Texas plant worked with the Texas Sentinels Foundation to provide wallboard for the new home of an injured veteran and his family of six in Abilene.



ECONOMIC **RESPONSIBILITY**



MOVING OUR INDUSTRY FORWARD WITH INNOVATION

Innovation is at the heart of everything we do at USG — how we develop new processes and products, how we manufacture and deliver those products, and how we serve our customers. For more than a century, our innovations have revolutionized the way customers design and build the places where we live, work and play. Our intellectual property portfolio is one of the largest in the sector with more than 3,200 active patents worldwide.

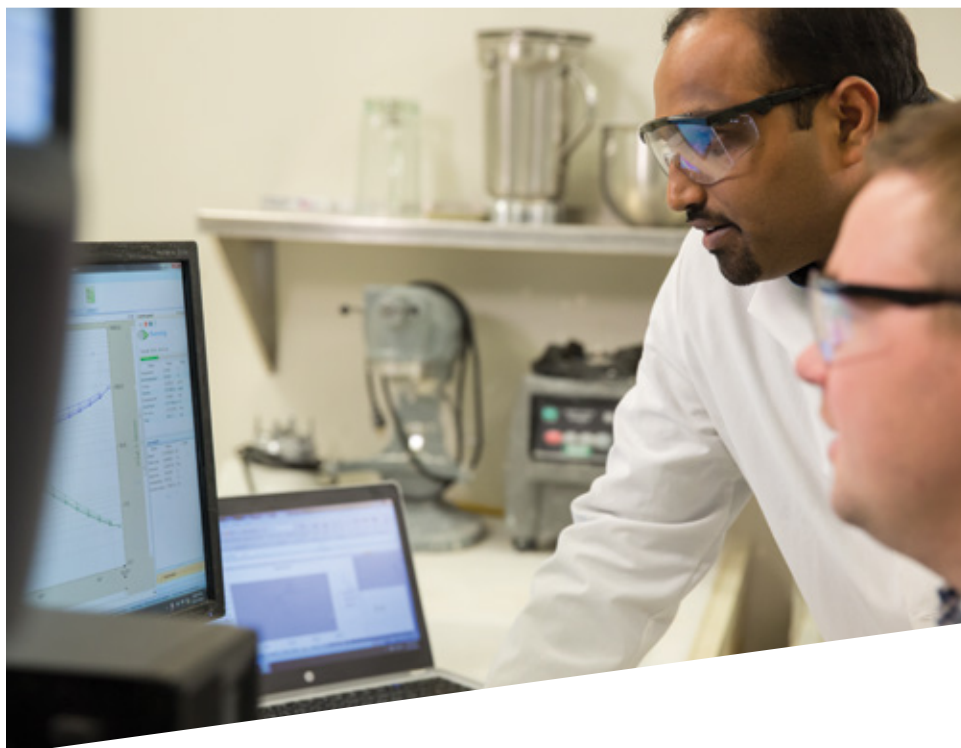
Much of our innovation starts at our Corporate Innovation Center (CIC) in Libertyville, Illinois, a state-of-the-art facility with laboratories for research, testing, materials analysis and pilot operations for our high-performance building products and system technologies. The CIC is staffed with a team of scientists, engineers and researchers who are leaders in their respective fields and who help set the industry standard for innovation. These forward-thinking professionals in material science; chemical, mechanical and civil engineering; physical, inorganic and analytical chemistry; and architecture have more than 1,500 years of combined experience. More than half of our research colleagues hold advanced degrees.

While one of our priorities is to implement the most cutting-edge technologies in the areas of sustainability, durability and longevity, no technology is worthwhile unless it performs in real-world construction. The CIC is instrumental in ensuring all of our products have the highest quality and safety features before they

USG holds more than

3,200

active patents
worldwide



go to market. Our fire and acoustical test facilities ensure the best products and best applications. Our experts use unique fire, acoustical, structural and environmental testing capabilities to evaluate products and systems, perform chemical analysis and material characterization, and assess safety and quality.

For example, teams from our CIC and Architectural Services division worked together to develop and extensively test a proprietary USG floor-ceiling assembly for a residential building in Vernon Hills, Illinois. The architect's design called for an open-web wood floor truss system, but the current floor-ceiling system would not ensure the required two-hour fire rating. Through a collaboration between USG, the architect and the building's developer, we created a new floor-ceiling assembly that not only meets the fire-rating requirement but also uses less material and has much better sound characteristics.

"USG was the science behind the solution," said Warren James, the real estate project's developer.



Innovator of the Year

The Executives' Club of Chicago named USG Corporation, as the 2015 Innovator of the Year. The Innovator of the Year is awarded to a company whose new product, service, process or business model has resulted in organic growth and measurable economic benefit to the region. Dr. Srinivas Veeramasuneni led the development team responsible for USG's breakthrough in cement technology with the launch of USG Durock® Brand EcoCap™ Self-Leveling Underlayment, a non-Portland cement based, contractor-installed floor preparation topping. The product utilizes USG's proprietary geopolymers technology to create a highly sustainable cementitious underlayment made primarily from an industrial by-product of coal combustion and sand.





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In addition, this sustainability report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 related to management's expectations about future conditions, including statements about future plans and results regarding sustainable efforts. Actual business, market or other conditions may differ materially from management's expectations and, accordingly, may cause actual results to differ materially from those expressed in this document. Actual results may differ materially due to various factors, including: economic conditions; shortages in raw materials; changes in raw material and energy costs; capacity utilization rates; our ability to protect our intellectual property and other proprietary rights; and changes in laws or regulations, including environmental and safety regulations. We assume no obligation to update any forward-looking information contained in this sustainability report. Additional information concerning these and other factors may be found in our filings with the Securities and Exchange Commission, including the "Risk Factors" in our most recent Annual Report on Form 10-K and Quarterly Report on Form 10-Q.