

ENVIRONMENTAL PRODUCT DECLARATION




GOLD BOND® EXP® SHEATHING AND GOLD BOND® EXP® FIRE-SHIELD® SHEATHING



National  Gypsum®

Gold Bond®
Building Products



Program Operator	NSF Certification LLC 789 N. Dixboro, Ann Arbor, MI 48105 www.nsf.org	
Manufacturer Name and Address	Gold Bond Building Products, LLC 2001 Rexford Road Charlotte, NC 28211	
Declaration Number	EPD10793	
Declared Product and Declared Unit	92.9 m ² (1,000 square feet) of Gold Bond® eXP® Sheathing 1/2 inch and Gold Bond® eXP® Fire-Shield® Sheathing 5/8 inch	
Reference PCR and Version Number	NSF PCR for Gypsum Panel Products (Version 1.1, 2020)	
Product's Intended Application and Use	Products are used on the outside of a wall and soffit framing as a substrate for exterior cladding. Products are available with a regular and a Type X gypsum core and can provide superior weather resistance.	
Product RSL	75 years	
Markets of Applicability	North America	
Date of Issue	10/21/2022	
Period of Validity	5 years from date of issue	
EPD Type	Product Specific	
Range of Dataset Variability	N/A	
EPD Scope	Cradle-to-Gate	
Year of reported manufacturer primary data	2020	
LCA Software and Version Number	GaBi 10.0.0.71	
LCI Database and Version Number	GaBi Database 2021.2	
LCIA Methodology and Version Number	TRACI 2.1 and IPCC AR5	
The sub-category PCR review was conducted by:	<ul style="list-style-type: none"> • Thomas P. Gloria, Industrial Ecology Consultants • Bill Stough, Sustainable Research Group • Jack Geibig, EcoForm 	
<p>This declaration was independently verified in accordance with ISO 14025: 2006. The NSF PCR for Gypsum Panel Products (Version 1.1) serves as the core PCR.</p> <p><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External</p>	<p>Tony Favilla afavilla@nsf.org</p> 	
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Lindsay Bonney, WAP Sustainability Consulting, LLC	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	<p>Jack Geibig - EcoForm jgeibig@ecoform.com</p> 	
<p>Limitations:</p> <p>Environmental declarations from different programs (ISO 14025) may not be comparable. Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, reference service life, and quantified by the same functional unit, and meeting all the conditions in ISO 14025, Section 6.7.2, can be used to assist purchasers and users in making informed comparisons between products.</p> <p>Full conformance with the PCR for Products allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.</p> <p>Additional information on the life cycle assessment can be found by contacting National Gypsum directly.</p>		

DESCRIPTION OF COMPANY

National Gypsum Company, headquartered in Charlotte, NC, is the exclusive service provider of reliable, high-performance building products manufactured by its affiliate companies and marketed under the Gold Bond®, ProForm®, and PermaBASE® brands.

PRODUCT DESCRIPTION

Use Gold Bond® eXP® Sheathing 1/2-inch and Gold Bond® eXP® Fire-Shield® Sheathing 5/8-inch on the outside of a wall and soffit framing as a substrate for exterior cladding. These products are available with a regular (1/2-inch board) and a specially treated, fire-resistant, Type X gypsum core (5/8-inch board). eXP Sheathing consists of a moisture- and mold-resistant gypsum core encased in a coated, specially designed PURPLE fiberglass mat on the face, back and sides. The glass mat is folded around the long edges to reinforce and protect the core, and it provides superior weather resistance.

This EPD includes representative products manufactured by National Gypsum’s affiliate, Gold Bond Building Products, produced at the facilities shown in the table below. A weighted average of each manufacturing input (energy, water, waste, etc.) was utilized based on 2020 production as products are made at multiple facilities.

Table 1: Manufacturing Facilities

1/2 inch board	5/8 inch board
Apollo Beach, FL	Apollo Beach, FL
Medicine Lodge, KS	Baltimore, MD
Phoenix, AZ	Medicine Lodge, KS
Shippingport, PA	Phoenix, AZ
Waukegan, IL	Richmond, CA
Wilmington, NC	Shippingport, PA
	Waukegan, IL
	Wilmington, NC

Gypsum used in the products is sourced from the plants below. These materials tend to be sourced from quarry nearest to the wallboard/manufacturing plant but that is not always the case.

Table 2: Quarries

Quarries
Halifax, Nova Scotia
Fort Dodge, IA
Rotan, TX
Sun City, KS
Tawas, MI
Winkelman, AZ

All products in this review are considered gypsum board products. The CSI code for these products is 09 29 00. The products included in this study fall under the following sub-category as defined by the PCR: gypsum panel products.

APPLICABLE PRODUCT STANDARDS

Applicable product standards for gypsum boards include:

- ASTM C11–18b Standard terminology relating to gypsum and related building materials and systems.
- ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- 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.

TECHNICAL DATA

Table 3 shows the technical specifications of the products, including any testing data as appropriate.

Table 3: Technical Details

Parameter	eXP Sheathing 1/2 inch and eXP Fire-Shield Sheathing 5/8 inch
Performance	Sheathing, Mold & Moisture Resistant, fiberglass mat
Mold and Mildew Resistance	These products scored a 10 when tested in accordance with ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
Edge	Square
Thicknesses	1/2 inch; 5/8 inch
Width	48"
Color	Purple
Core	Regular gypsum core (eXP Sheathing 1/2 inch) Specially treated, fire-resistant, Type X gypsum core (eXP Fire-Shield Sheathing 5/8 inch)

MANUFACTURING

Gypsum arrives at the manufacturing plant and is ground and heated to remove chemically bound water, forming stucco. The stucco is then mixed with water and other materials to make the core. The core is encased in fiberglass facers. The board is then left to harden, maintaining 20-30% moisture, before being cut and put through a drying process. The edges are trimmed and panels are stacked on risers before the products are distributed.

MATERIAL COMPOSITION

Unique product compositions were provided for each product and manufacturing site. The average compositions across all manufacturing sites were utilized in the study and are shown in Table 4 below. The raw materials for the product were obtained from various suppliers across North America, in addition to the paper mills and quarries owned by affiliates of National Gypsum Company. The products under review are packaged with end tape and tear tape before distribution.

Table 4: Material Composition

	eXP Sheathing 1/2 inch	eXP Fire-Shield Sheathing 5/8 inch
Natural Gypsum, including virgin and reclaimed	60 - 70%	60 - 70%
Synthetic Gypsum	20 - 25%	15 - 25%
Water	10 - 20%	10 - 20%
Fiberglass Mat	0 - 5%	0 - 5%
Other Materials	0 - 5%	0 - 5%

This study does not include the impacts associated with installation, use, maintenance, repair, operational energy and water use, replacement, refurbishment, and disposal.

LIFE CYCLE ASSESSMENT BACKGROUND INFORMATION

DECLARED UNIT

The declared unit is 92.9 m² (1,000 square feet) of gypsum board. The products reviewed are used on the outside of a wall and soffit framing as a substrate for exterior cladding and are available with a regular and a Type X gypsum core and can provide superior weather resistance.

Table 5: Declared Unit

	eXP Sheathing 1/2 inch	eXP Fire-Shield Sheathing 5/8 inch
Mass per declared unit [kg]	1,038	1,364

SYSTEM BOUNDARY

This LCA is a Cradle-to-Gate study. An overview of the system boundary is shown in Figure 1 and a summary of the life cycle stages included in this LCA is presented in Table 6.

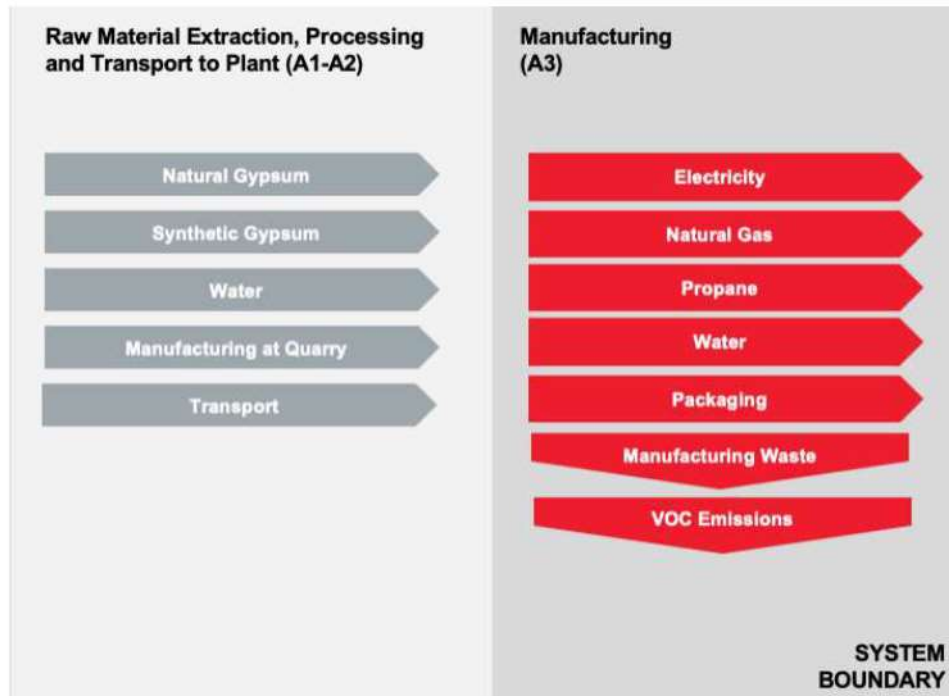


Figure 1: System Boundary

A summary of the life cycle modules included in this EPD is presented in Table 6. Infrastructure flows have been excluded.

Table 6: Life Cycle Stages Included in the Study

Production			Construction		Use							End of Life				Benefits & Loads Beyond System Boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Material Supply	Transport	Manufacturing	Transport to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

CUT-OFF CRITERIA

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of the analysis. Material inputs less than 1% were included if sufficient data were available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the declared unit. No known flows were deliberately excluded from this EPD.

ALLOCATION

General principles of allocation were based on ISO 14040/44.

To derive a per-unit value for the manufacturing inputs/outputs, mass allocation based on total production at each manufacturing facility was adopted. For all plants that make the reviewed products, the total consumption during 2020 was divided by the total production mass during 2020 to derive a weighted-average use-per-production unit value. Gold Bond Building Products' associates determined the best way to allocate inputs. This allocation methodology was used for the following inputs:

- Electricity
- Diesel
- Gasoline
- Thermal Energy from Natural Gas
- Propane
- Water
- Waste

Discussions with Gold Bond Building Products' staff divulged this was a representative way to allocate the manufacturing inputs/outputs due to the fact that all products created at the facilities are similar in nature. As a default, secondary GaBi datasets use a physical mass basis for allocation.

LIFE CYCLE ASSESSMENT RESULTS

All results are given per declared unit, which is 92.9 m² of gypsum board. Environmental impacts were calculated using the GaBi software platform. Impact results have been calculated using the TRACI 2.1 and IPCC AR5 impact assessment methodologies. Results presented in this report are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

Table 7: LCIA Indicators

Abbreviation	Parameter	Unit
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO ₂ eq
EP	Eutrophication potential	kg N eq
GWP	Global warming potential (100 years, includes biogenic CO ₂)	kg CO ₂ eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
ADP _{fossil}	Depletion of non-renewable fossil fuels	MJ, surplus energy
SFP	Smog formation potential	kg O ₃ eq
IPCC AR5		
GWP, excl	GWP100, excl biogenic carbon [kg CO ₂ eq.]	kg CO ₂ eq
GWP, incl	GWP100, incl biogenic carbon [kg CO ₂ eq.]	kg CO ₂ eq

Table 8: Biogenic Carbon Indicators

Abbreviation	Parameter	Unit
BCRP	Biogenic Carbon Removal from Product	[kg CO ₂]
BCEP	Biogenic Carbon Emission from Product	[kg CO ₂]
BCRK	Biogenic Carbon Removal from Packaging	[kg CO ₂]
BCEK	Biogenic Carbon Emission from Packaging	[kg CO ₂]
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO ₂]
CCE	Calcination Carbon Emissions	[kg CO ₂]
CCR	Carbonation Carbon Removals	[kg CO ₂]
CWNR	Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	[kg CO ₂]

Table 9: Resource Use, Waste, and Output Flow Indicators

Abbreviation	Parameter	Unit
Resource Use Parameters		
RPR _E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value (LHV)
RPR _M	Use of renewable primary energy resources used as raw materials	MJ, net calorific value
RPR _T	Total use of renewable primary energy resources	MJ, net calorific value
NRPR _E	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _M	Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _T	Total use of non-renewable primary energy resources	MJ, net calorific value
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value

Abbreviation	Parameter	Unit
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Net use of fresh water	m ³
Waste Parameters and Output Flows		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EEE	Exported electrical energy	MJ
EET	Exported thermal energy	MJ

The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the variability of the final results and make comparisons misleading. Without understanding the specific variability, the user is therefore, not encouraged to compare EPDs.

eXP SHEATHING 1/2 INCH

The LCIA results presented below are for 92.9 m² (1,000 square feet) of gypsum board.

Impact Category	Total A1-A3	A1	A2	A3
TRACI LCIA Impacts (North America)				
AP [kg SO ₂ eq]	1.25E+00	7.06E-01	2.59E-01	2.89E-01
EP [kg N eq]	1.32E-01	4.71E-02	1.70E-02	6.76E-02
GWP, incl biogenic carbon [kg CO ₂ eq]	4.28E+02	2.00E+02	2.16E+01	2.07E+02
ODP [kg CFC 11 eq]	1.09E-07	1.09E-07	4.21E-15	3.71E-10
ADP-fossil fuel [MJ]	9.89E+02	4.01E+02	4.02E+01	5.47E+02
SFP [kg O ₃ eq]	2.73E+01	1.58E+01	5.81E+00	5.64E+00
IPCC AR5				
GWP100, excl biogenic carbon [kg CO ₂ eq.]	4.84E+02	2.05E+02	2.18E+01	2.57E+02
GWP100, incl biogenic carbon [kg CO ₂ eq.]	4.44E+02	2.04E+02	2.19E+01	2.18E+02
Carbon Emissions and Uptake				
BCRP [kg CO ₂]	1.18E+00	1.18E+00	-	-
BCEP [kg CO ₂]	-	-	-	-
BCRK [kg CO ₂]	3.47E+01	-	-	3.47E+01
BCEK [kg CO ₂]	-	-	-	-
BCEW [kg CO ₂]	-	-	-	-
CCE [kg CO ₂]	-	-	-	-
CCR [kg CO ₂]	-	-	-	-
CWNR [kg CO ₂]	-	-	-	-

Impact Category	Total A1-A3	A1	A2	A3
Resource Use Indicators				
RPR _E [MJ]	1.40E+03	4.96E+02	1.13E+01	8.96E+02
RPR _M [MJ]	2.66E+01	-	-	2.66E+01
RPR _T [MJ]	1.43E+03	4.96E+02	1.13E+01	9.23E+02
NRPR _E [MJ]	7.77E+03	3.39E+03	3.03E+02	4.08E+03
NRPR _M [MJ]	-	-	-	-
NRPR _T [MJ]	7.77E+03	3.39E+03	3.03E+02	4.08E+03
SM [kg]	3.33E+00	3.33E+00	-	-
RSF [MJ]	-	-	-	-
NRSF [MJ]	-	-	-	-
RE [MJ]	-	-	-	-
FW [m ³]	1.26E+00	9.37E-01	4.77E-02	2.72E-01
Output Flows and Waste Categories				
HWD [kg]	1.64E-05	9.82E-06	2.43E-08	6.58E-06
NHWD [kg]	3.66E+01	1.08E+01	2.61E-02	2.58E+01
HLRW [kg]	1.56E-04	7.83E-05	1.01E-06	7.68E-05
ILLRW [kg]	1.44E-01	7.63E-02	8.51E-04	6.68E-02
CRU [kg]	-	-	-	-
MR [kg]	1.23E+01	-	-	1.23E+01

Impact Category	Total A1-A3	A1	A2	A3
MER [kg]	-	-	-	-
EEE [MJ]	3.24E+00	-	-	3.24E+00
EET [MJ]	1.52E+00	-	-	1.52E+00

eXP FIRE-SHIELD SHEATHING 5/8 INCH

The LCIA results presented below are for 92.9 m² (1,000 square feet) of gypsum board.

Impact Category	Total A1-A3	A1	A2	A3
TRACI LCIA Impacts (North America)				
AP [kg SO ₂ eq]	1.51E+00	8.96E-01	3.15E-01	2.99E-01
EP [kg N eq]	1.54E-01	6.18E-02	1.96E-02	7.30E-02
GWP, incl biogenic carbon [kg CO ₂ eq]	4.67E+02	2.37E+02	2.49E+01	2.05E+02
ODP [kg CFC 11 eq]	6.22E-07	6.22E-07	4.81E-15	3.71E-10
ADP-fossil fuel [MJ]	1.05E+03	4.57E+02	4.60E+01	5.50E+02
SFP [kg O ₃ eq]	3.41E+01	2.15E+01	6.99E+00	5.60E+00
IPCC AR5				
GWP100, excl biogenic carbon [kg CO ₂ eq.]	5.24E+02	2.43E+02	2.51E+01	2.56E+02
GWP100, incl biogenic carbon [kg CO ₂ eq.]	4.84E+02	2.42E+02	2.52E+01	2.17E+02
Carbon Emissions and Uptake				
BCRP [kg CO ₂]	1.18E+00	1.18E+00	-	-
BCEP [kg CO ₂]	-	-	-	-
BCRK [kg CO ₂]	3.47E+01	-	-	3.47E+01
BCEK [kg CO ₂]	-	-	-	-
BCEW [kg CO ₂]	-	-	-	-
CCE [kg CO ₂]	-	-	-	-
CCR [kg CO ₂]	-	-	-	-
CWNR [kg CO ₂]	-	-	-	-

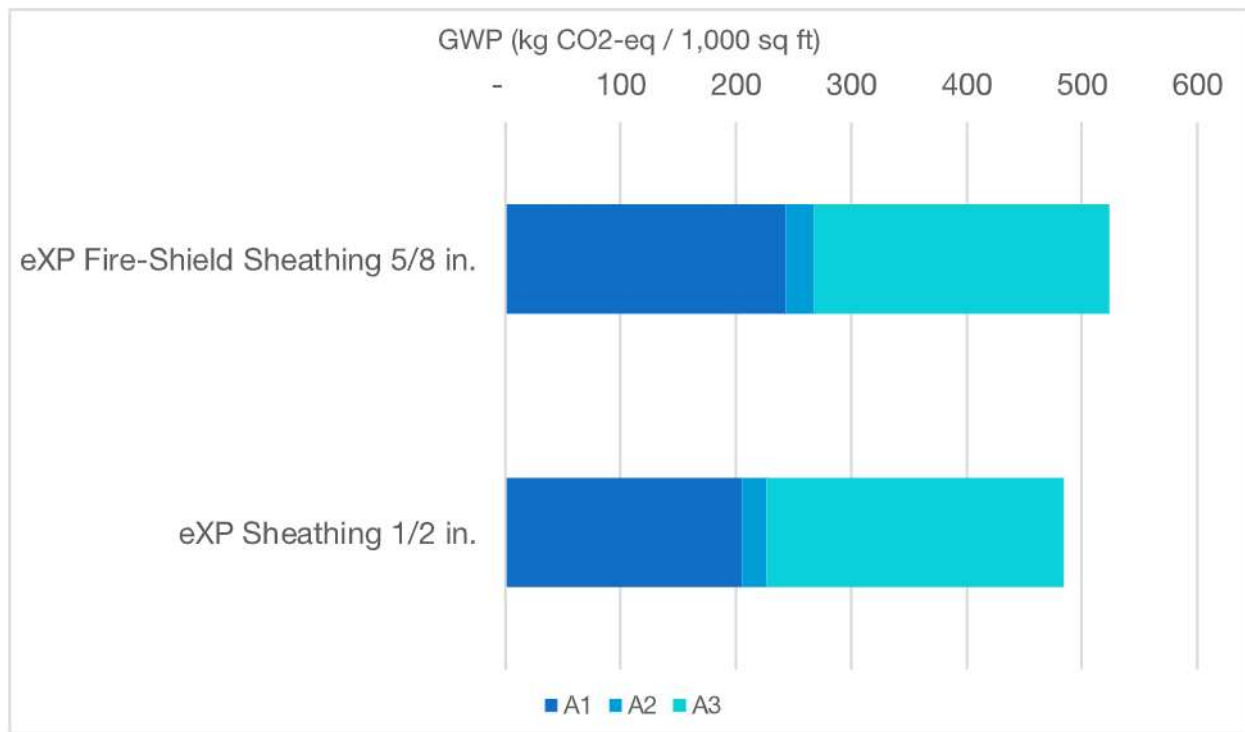
Impact Category	Total A1-A3	A1	A2	A3
Resource Use Indicators				
RPR _E [MJ]	1.48E+03	5.84E+02	1.25E+01	8.85E+02
RPR _M [MJ]	2.66E+01	-	-	2.66E+01
RPR _T [MJ]	1.51E+03	5.84E+02	1.25E+01	9.12E+02
NRPR _E [MJ]	8.32E+03	3.92E+03	3.47E+02	4.05E+03
NRPR _M [MJ]	-	-	-	-
NRPR _T [MJ]	8.32E+03	3.92E+03	3.47E+02	4.05E+03
SM [kg]	3.33E+00	3.33E+00	-	-
RSF [MJ]	-	-	-	-
NRSF [MJ]	-	-	-	-
RE [MJ]	-	-	-	-
FW [m ³]	1.44E+00	1.12E+00	5.28E-02	2.67E-01
Output Flows and Waste Categories				

Impact Category	Total A1-A3	A1	A2	A3
HWD [kg]	1.68E-05	1.02E-05	2.75E-08	6.58E-06
NHWD [kg]	4.17E+01	1.15E+01	2.93E-02	3.02E+01
HLRW [kg]	1.71E-04	9.65E-05	1.16E-06	7.37E-05
ILLRW [kg]	1.56E-01	9.04E-02	9.73E-04	6.42E-02
CRU [kg]	-	-	-	-
MR [kg]	1.61E+01	-	-	1.61E+01
MER [kg]	-	-	-	-
EEE [MJ]	3.86E+00	-	-	3.86E+00
EET [MJ]	1.81E+00	-	-	1.81E+00

LIFE CYCLE ASSESSMENT INTERPRETATION

A dominance analysis was performed for all products in the LCA to show which of the life cycle modules contributes to the majority of the impacts. Due to the relevance of this impact category to the product type and the manufacturer's interests, this dominance analysis is provided for IPCC AR5 Global Warming Potential (GWP) 100, excluding biogenic carbon results.

Global warming potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specified time horizon and measured relative to carbon dioxide.



The dominance analysis shows that the impacts from raw material extraction (A1) and manufacturing (A3) are nearly equivalent at an average of 44% and 51%, respectively, while impacts from transportation (A2) are significantly lower (5%). At a more granular level, we find natural gypsum and synthetic gypsum are the largest contributors to A1 impacts at 11-15% and 13-14% of overall emissions, respectively. The emissions sources contributing the most within the manufacturing stage (A3) are natural gas and electricity usage at the wallboard plants, accounting for 38-40% and 5-7% of overall emissions, respectively.

Some limitations to the study have been identified as follows:

- Only facility-level data were provided for manufacturing processes. Sub-metering of specific product lines would allow for more accurate manufacturing impacts to be modeled.
- Availability of geographically more accurate datasets would have improved the accuracy of the study.

- Since this LCA uses the cut-off approach to model recycled material in the product, no credit is given to the product system. Instead, the manufacturer realizes reduced environmental impacts through the absence of the burden of extracting virgin material.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

ADDITIONAL ENVIRONMENTAL INFORMATION

ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

Gold Bond Building Products maintains certifications with UL and HPD Collaborative. eXP Sheathing 1/2 inch and eXP Fire-Shield Sheathing 5/8 inch are GREENGUARD certified. Additionally, a Health Product Declaration (“HPD”) was created for eXP Fire-Shield Sheathing 5/8 inch.

REFERENCES

1. Life Cycle Assessment, LCA Report for National Gypsum – Gypsum Boards. WAP Sustainability Consulting. September 2022.
2. NSF Product Category Rule (PCR) for Gypsum Panel Products Version 1.1 (April 2020)
3. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
4. ISO 14044: 2006/ Amd 1:2017 Environmental Management – Life cycle assessment – Requirements and Guidelines – Amendment 1.
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
6. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.