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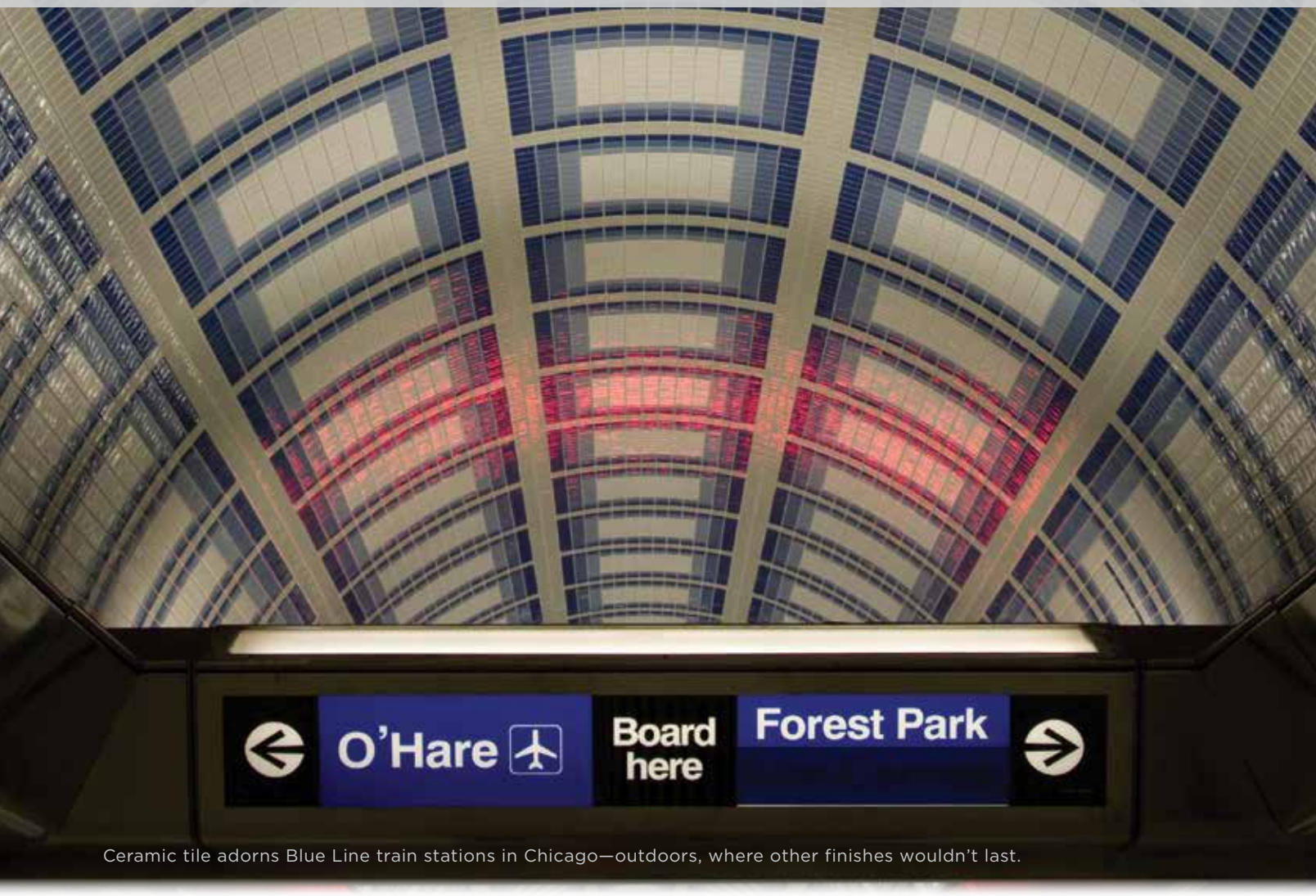
TILE
THE NATURAL CHOICE

2026

Sustainability
Starts with Standards



Ceramic tile adorns Blue Line train stations in Chicago—outdoors, where other finishes wouldn't last.

Design/Build it to Last

ANSI A137 product performance standards for ceramic and glass tiles

ANSI A118 product performance standards for mortars, grouts, and membranes

ANSI A108 installation and workmanship standards

***TCNA Handbook*: installation systems for ceramic, glass and stone tile**

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CONTENTS

TILE
THE NATURAL CHOICE

Stands the Test of Time

Ceramic tile has been the preferred choice around the world for centuries for its inherent beauty and durability, and because the natural materials used to make tile are so abundant. And the endless design options can make each installation a unique work of art to be enjoyed for generations.

Inspires Design

Explore unlimited design and customization possibilities. Mix colors, textures, patterns, shapes and styles to make every installation unique. Get the look of wood, natural stone, wallpaper, even delicate fabrics, but with the durability of ceramic tile. And with tiles following the latest color trends, color matching is a breeze. You can even take your design to the next level. Find a manufacturer that specializes in custom mosaic murals, waterjet cutting, or hand painting.

Provides Unequaled Versatility

- Hypoallergenic
- Easy to sterilize
- Fire resistant
- Chemical resistant
- Enhanced traction products available
- Stain resistant, easy to clean
- Exteriors, including freeze/thaw climates
- Dry, wet, and submerged applications
- Durable: withstands heavy foot and wheel traffic

Delivers Robust Sustainability

Recycled Content and Waste Reclamation

Many factories are effectively closed loop facilities with zero waste, high levels of recycling, and efficient resource management.

Exceptional Life-Cycle Cost = Best Value

Ceramic tile has an exceptional life cycle. See the life-cycle cost study in this guide for data on how ceramic tile outperforms other floor finishes in terms of cost per square foot over time.

Regional Manufacturing and Raw Materials

With tile manufacturers in many regions of North America, tile and installation products made with local raw materials are widely available, greatly reducing the energy consumption and emissions of long distance shipping. In many cases, the raw materials are mined within 500 miles of both the manufacturing facility and the job site. Plus, the clays and other materials used to make tile are plentiful.

Best Indoor Air Quality and Zero VOCs

The high firing temperature of ceramic tile—generally more than 2000°F—burns off all organic compounds. Plus, ceramic tile is inhospitable to bacteria, fungi, mold, and other irritants that contribute to allergies and asthma. All this allows ceramic and glass tiles to easily meet low-emitting material requirements, contribute to pre-occupancy air quality plans, and provide superior indoor air quality for building occupants.

Lower Energy Needs

Tile can reduce the amount of energy needed for heating and cooling because of its exceptional thermal mass.

Reduced Heat Island Effect

Using light-colored tiles instead of traditional paving materials can lower an area's heat absorption, or heat island effect. Green buildings in urban areas in particular are required to reduce the potential heat island effect.

Building Material Reuse

Tile finishes are among the few surfaces that can be salvaged in a major renovation.

Eco-Friendly Maintenance

No harsh chemicals required!

Ceramic tile is an ideal choice for ventilated façade projects.

Tile can provide an aesthetic advantage, due to the wide range of colors, surfaces and sizes, allowing for virtually unlimited design opportunities.

A ventilated tile façade can reduce a building's energy consumption 20-30% due to the natural chimney effect it creates between the structure and the cladding. Hot air is evacuated in summer, and insulation is more effective in winter.

TILE AND GREEN BUILDING
CREDITS AND REQUIREMENTS

	Leadership In Energy and Environmental Design [LEED 4.1] vs. (LEED v5)	2024 International Green Construction Code (ASHRAE Standard 189.1)
MULTI-ATTRIBUTE SUSTAINABILITY: CONFORMANCE TO GREEN SQUARED®	[(Pilot Credit—Certified Multi-attribute Products and Materials)] (Building Product Selection and Procurement—Human Health, Climate Health, Ecosystem Health, Social Health & Equity, Circular Economy)	901.5.1.4 (9.5.1.4) Third-Party Multi-attribute Certification
LCA OR EPD	[Environmental Product Declarations] (Building Product Selection and Procurement—Climate Health)	901.4.2 (9.4.2) Environmental Product Declaration Requirements
RECYCLED CONTENT	[Sourcing of Raw Materials] (Building Product Selection and Procurement—Circular Economy)	901.5.1.1.1 (9.5.1.1.1) Recycled Content
PRODUCT REUSABILITY/ RECYCLABILITY	[Sourcing of Raw Materials] (Building and Materials Reuse)	901.5.1.1 (9.5.1.1) Recycled Content and Salvaged Material Content
REGIONAL MATERIALS	[Building Product Disclosure and Optimization—Sourcing of Raw Materials] (Building Product Selection and Procurement—Climate Health)	901.5.1.2 (9.5.1.2) Regional Materials
CONSTRUCTION/ DESIGN MANAGEMENT	[Integrative Process, Construction Indoor Air Quality Management Plan, Indoor Air Quality Assessment, and Construction and Demolition Waste Management] (Construction Management—Indoor Air Quality) (Air Quality Testing and Monitoring) (Climate Resilience Assessment, Carbon Assessment, and Integrative Design Process) (Construction and Demolition Waste Diversion)	9.1.6 (9.6) Construction and Demolition Waste Management 100.1.7 (10.7) Preoccupancy IAQ
INDOOR ENVIRONMENTAL QUALITY	[(Low-Emitting Materials)] [Thermal Comfort] [Interior Lighting] (Occupant Experience)	801.6.1.1 (8.6.1.1) Adhesives and Sealants 801.6.1.3 (8.6.1.3) Floor Covering Materials 801.6.1.6 (8.6.1.6) Ceiling and Wall Assemblies and Systems
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ENERGY EFFICIENCY	[Optimize Energy Performance] (Minimum Energy Efficiency) (Enhanced Energy Efficiency)	701.4.2 (7.1.4.2) Building Envelope Performance Option 701.6 (7.6)
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OTHER PRODUCT ATTRIBUTES OR MANUFACTURER ENGAGEMENT INITIATIVES	[Open Space] [Building Product Disclosure and Optimization—Sourcing of Raw Materials] [Building Product Disclosure and Optimization—Material Ingredients] [Innovation] (Project Priorities) (Building Product Selection and Procurement—Human Health)	104.2.5 Innovative Approaches and Alternative Materials, Design, and Methods of Construction and Equipment 1001.9.4 (10.9.4) Building Green Cleaning Plan

NAHB National Green Building Standard (ICC/ASHRAE 700–2020)	ANSI/GBI 01-2024 Green Globes	G2 GREEN SQUARED CERTIFIED®
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TCNA BULLETIN
CERAMIC TILE FOR A SAFE AND HEALTHY HOME

Ceramic tile is not only beautiful, it's also healthy for your home. It contains none of the chemicals that have been in the news associated with other flooring products, and it's long-lasting, easy to clean, fire-safe, and offers many slip-resistant choices.

Made of Clay and other Naturally-Occurring Minerals: Free of Formaldehyde, VOCs, and PVC

Ceramic tile* does not contain the chemicals in other floor coverings that are receiving increased attention for their possible adverse health effects, such as formaldehyde,[1-4] VOCs (volatile organic compounds)[5-9] or PVC (polyvinyl chloride).[10-11]

Zero VOCs. Some VOCs emitted by non-ceramic building products can contribute to a wide variety of health problems and "Sick Building Syndrome," according to various health experts.[12-15] Because ceramic tile is fired at extremely high temperatures, producing an inorganic material, it has zero VOCs.*

Formaldehyde-Free. Ceramic tile* contains none of the formaldehyde found in some other floor coverings. Formaldehyde is a chemical long associated with respiratory disorders, and exposure is a particular concern for children and the elderly, according to the Centers for Disease Control (CDC).[16-17] In fact, formaldehyde emissions for several wood-based building and flooring products have been federally restricted since 2011 under the Formaldehyde Standards for Composite Wood Products Act.[18-21] As a fired product, ceramic tile is formaldehyde-free and not subject to this or any other such restriction.

PVC-Free. Ceramic tile* is also free from PVC, a resin used in other types of floor coverings, and regularly a subject of concern and discussion among health experts.[22-33]

The easy solution for flooring? Use ceramic tile, which is free of VOCs, formaldehyde, and PVC!

Occupant Safety

Of the many flooring choices available, ceramic tile stands out when slip/fall safety is a consideration because of the thousands of floor tile choices that are slip-resistant when wet. This is in stark contrast to floorings that, according to their manufacturers, must be kept dry in order to be slip-resistant.

Additionally, ceramic tile* is non-flammable and does not produce smoke in a fire, meeting the flame spread and smoke development requirements of Section 803 of the International Building Code (IBC) for interior wall and ceiling materials.

Environment

The UL-certified Environmental Product Declaration (EPD) for North American-made ceramic tile shows that North American-made ceramic tile has the lowest environmental impact across all impact categories, when compared to other floorings with generic EPDs[34-35] evaluated under the same product category rules.[36] With a 75-year service life[34] this makes ceramic tile both cost-effective and the best choice for reducing negative environmental impacts, resource use, and demolition waste, when compared to flooring products that need to be replaced more frequently.

Disclaimer: The above information is general in nature and is not specific to any one building product. Ceramic tile products and their properties can vary among manufacturers, products lines, and even among tiles in the same product line. Likewise, non-ceramic tile products have their own properties and can also vary among manufacturers and products. Products that contain any of the chemicals referenced above may contain them in manners that are not known to be harmful and/or that comply with applicable health and safety regulations. Contact the manufacturer of a specific building product to learn about its particular characteristics. See opposite for notes and numbered references.

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Notes

*Applies to fired ceramics free of any mesh backing or topical sealer. Not all mesh backings and topical sealers produce volatile organic compounds or contribute to flame spread. Consult manufacturer for specific product information if desired.

†Based on independent studies performed at TCNA Laboratory on tiles without mesh backing or topical sealers.

‡More than 95% of a fired ceramic tile is made from clay and other raw materials found in nature.

§Per UL-Certified Environmental Product Declaration (EPD) for North American-made Ceramic Tile.

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Life Cycle Cost Analysis

Floor Coverings Comparison

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Contents

Life-Cycle Costs for Flooring in Commercial Buildings
Floor Covering Comparison Study

Emily Lorenz, PE, F-ACI, is an independent consultant in the areas of life-cycle assessment (LCA), environmental product declarations (EPDs), product category rules (PCRs), green building, and sustainability. She serves as an engineer in the areas of green structures and practices, energy efficiency, thermal properties, and moisture mitigation. Lorenz also specializes in building code and standards work and advocacy. She actively participates as vice-chair of the Envelope Subcommittee developing the commercial provisions of the 2024 International Energy Conservation Code (IECC), and as a voting member of several committees including the 2024 IECC Commercial Committee; the Envelope Subcommittee of ASHRAE 90.1; ASTM International Committee E60, Sustainability; the American Concrete Institute's (ACI's) building code subcommittee on sustainability; ACI Committee 130, Sustainability of Concrete; Joint ACI-TMS Committee 122, Energy Efficiency of Concrete and Masonry Systems; Joint ACI-ASCE Committee 550, Precast Concrete Structures; and several other technical associations and committees. She also serves as an expert to ISO TC59\SC17\WG3 Environmental Declarations of Products. Lorenz received her BS and MS in civil engineering (structural emphasis) from Michigan Technological University, Houghton, MI, USA.

Life-Cycle Costs for Flooring in Commercial Buildings
Floor Covering Comparison Study

The Tile Council of North America commissioned an independent consultant, Emily Lorenz, PE, F-ACI, to conduct a Life Cycle Cost Analysis study.

Introduction

There are several methods available to evaluate and compare the economic performance of products or systems. For this study, life-cycle cost analysis (LCCA) is used to compare 18 flooring types installed in a typical office building. For the purpose of this study, a typical office building is defined according to the commercial building characteristics included in the 2018 Commercial Buildings Energy Consumption Survey from the U.S. Energy Information Administration. The LCCA was conducted according to ASTM E917-17, Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems.

An LCCA is a powerful tool to aid decision makers in evaluating all relevant costs for a given building system. Costs are summed in terms of either present values or annual values over a specified period of time; for this study, present values are used. This allows for comparison of the construction and maintenance costs of alternative building systems that meet the same functional requirements. In this study, the functional requirements of all flooring types are that they are fit for use and provide adequate durability and cleanliness for light to medium commercial use in office space.

This is not to say that all flooring types naturally receive the same soil load, wear pattern, or abrasive conditions, nor is their appearance similar. As such, soil conditions and appearance affect the maintenance cycle and expectations for each product category. For example, marble and other stone flooring are often used in areas where foot traffic and abrasive conditions are frequent (for example, commercial building lobbies), yet are generally expected to have a highly polished finish. Because of this, maintenance for stone flooring is more involved than materials such as carpet, for example, which has a different expected appearance and soil load.

Eighteen Flooring Types of the Study	
CSI Designation	**Flooring Types**
09 30 13	Ceramic Tile
09 30 13	Quarry Tile
09 30 13	Porcelain Tile
09 62 19	Laminate
09 63 40	Marble
09 63 40	Granite
09 63 40	Travertine
09 63 40	Limestone
09 64 19	Engineered Wood
09 64 29	Solid Wood
09 65 16.23	Sheet Vinyl
09 65 19.19	Vinyl Composition Tile (VCT)
09 65 19.23	Flexible Luxury Vinyl Flooring (LVF/LVP)
09 65 19.43	Rigid Core Flooring (RCB, SPC, WPC, etc.)
09 66 13	Epoxy Terrazzo
09 67 23	Poured Epoxy
09 68 13	Carpet Tiles/Carpet Squares
09 68 16	Nylon Broadloom Carpet

Table 1

Although this study was based on flooring use in light to medium commercial applications, many of the results would be applicable to residential applications as well. Differences in wear and cleaning routines between residential and light to medium commercial applications are similar for the eighteen flooring types studied, with the primary difference being an increased loading for commercial applications attributed to more frequent rolling of carts and higher pedestrian traffic.

A note about conservative assumptions: This study was primarily funded by the Tile Council of North America (TCNA) although with financial and technical support from several industry associations representing other

flooring types. While the selection of engineering parameters was made by the author without influence from TCNA or others, as a condition of undertaking this report and to avoid any suggestion of bias favoring the source of primary financial support, in the evaluation of any data ambiguities, any reasonable choices that could potentially favor the selection of flooring types other than ceramic, porcelain, and quarry tile were preferred. These choices are identified and referred to as conservative assumptions within the author's full report available at **http://bit.ly/3UBUPHF**.

The 18 types of flooring considered in this LCCA are listed in **Table 1**, ordered by their CSI designation.

For this study, annual 2020 costs were chosen because they represented the most-current values that were not influenced by COVID-19 pandemic-related fluctuations. When cost data were not available in the RS Means database, online searches of cost data from big-box retailers were used or industry sources were consulted to approximate cost data in relation to available RS Means data.

Basic LCCA Criteria

As consumers look toward more-sustainable and durable products, it is common to consider the impacts and costs over the full life cycle of a building. When evaluating the environmental impact of a material, both the International Green Construction Code (IgCC) and ASHRAE 189.1, Standard for the Design of High-Performance Green Buildings, use a 75-year period of analysis. In keeping with those standards, a 75-year study period was used for this analysis. To check the sensitivity of the analysis however to this study period, additional analyses were run with a study period of 40 years.

To compare future costs, such as maintenance and replacements, occurring at different times over the life of a building, such future costs are "discounted" back to their net present value. That is, the discount rate reflects what a dollar today will be worth in the future with interest, and conversely, what an expense in the future would cost today if those dollars today were saved and interest earned on them. Per ASTM E917, "The discount rate is used to convert costs occurring at different times to equivalent costs at a common point in time."

A real discount rate of 3% was used for this study, which is expressed in terms net of general price inflation. This means whatever cost increases occur in the future due to inflation, this study assumes the rate of interest to be three percentage points greater than that inflation.

The 3% real discount rate was chosen based on Lavappa and Kneifel (2018), which set the real discount rate based on "long-term Treasury Bond rates averaged over 12 months and the general inflation rate." In its Technical Note 2032 rev 2, the National Institute of Standards and Technology notes that average discount rates range from -0.5% to 7% (NIST 2021). To check the sensitivity of this LCCA analysis to this discount rate, additional analyses were run at discount rates of 0%, 5%, and 7%.

Summary and Results

The following chart summarizes the installed cost for each flooring type, the lifetime cost in net present dollars for each flooring, the reference service life for each flooring, and the cost per year averaged over the full building life. Costs associated with daily cleaning practices common to all flooring types, whether regular dusting, mopping, or vacuuming, were assumed to be the same and were equally applied to each material's life cycle cost. For those flooring types that did not have an estimated service life that was a multiple of the study period, a residual value was calculated at the end of the study period and subtracted from the net present value. The residual value is calculated as a percentage of the initial cost discounted back to the net present value from 75 years.

Compared to costs presented above using a 3% discount rate, a higher discount rate decreases the impact of future costs on the net present value. Conversely, a lower discount rate increases the impact of future costs.

Shortening the building life from 75 years to any lesser number puts greater emphasis on the cost of the initial installation and eliminates the impact of maintenance and replacements beyond the study period (in this case 40 years). However, the cost per foot per year for all floorings goes up as the costs are not amortized over the longer building lifetime.

Life-Cycle Costs for Flooring in Commercial Buildings				
Material Type	**Initial Installation Cost[1] (per sq.ft.)**	**Life Cycle Cost[2] (per sq.ft.)**	**Estimated Useful Life**	**Cost Per Year[3] (per sq. ft.)**
Quarry Tile	$9.53	$71.31	75 years	$0.95
Ceramic Tile	$11.03	$72.81	75 years	$0.97
Porcelain Tile	$11.38	$73.16	75 years	$0.98
Solid Wood	$8.92	$75.78	75 years	$1.01
Engineered Wood	$7.92	$78.76	25 years	$1.05
Limestone	$24.30	$101.68	75 years	$1.36
Travertine	$24.30	$101.68	75 years	$1.36
Granite	$26.65	$102.69	75 years	$1.37
Marble	$26.65	$104.03	75 years	$1.39
Nylon Broadloom Carpet	$5.86	$125.41	5 years	$1.67
LVF	$4.56	$131.66	15 years	$1.76
Carpet Tile	$5.25	$132.57	5 years	$1.77
Rigid Core	$6.36	$136.13	15 years	$1.82
Epoxy Terrazzo	$13.66	$137.22	75 years	$1.83
Laminate	$8.49	$138.45	20 years	$1.85
Poured Epoxy	$11.49	$155.91	15 years	$2.08
VCT	$3.09	$159.48	15 years	$2.13
Sheet Vinyl	$7.10	$169.46	15 years	$2.26

Table 2
Costs calculated for light to medium commercial use in office space.
[1] Initial installation costs are the addition of the material and labor costs for each respective material type.
[2] Life cycle costs are expressed as net present values (NPVs).
[3] Costs per year are the life cycle costs for each respective material divided by the length of the study period (75 years).

In total eight analyses were performed

- 3% Discount rate with a 75-year study period (presented in **Table 2**)
- 7% Discount rate with a 75-year study period
- 5% Discount rate with a 75-year study period
- 0% Discount rate with a 75-year study period
- 7% Discount rate with a 40-year study period
- 5% Discount rate with a 40-year study period
- 3% Discount rate with a 40-year study period
- 0% Discount rate with a 40-year study period

In all cases, quarry tile, ceramic tile, porcelain tile, solid wood and engineered wood cost less per year than all other floorings. Also, in all cases, poured epoxy, VCT, and sheet vinyl cost more than all other floorings.

For flooring products between these least and most expensive categories, some of the relative rankings moved slightly depending on the discount rate and study period. As an example, using a 0% discount rate and a 40-year study period, the only changes from the table above using a 3% discount rate and 75-year study period were that granite had a lower life-cycle cost than limestone and epoxy terrazzo had a lower life-cycle cost than LVF. To see all the analyses, refer to the author's full report available at http://bit.ly/3UBUPHF

For specific projects using a building lifetime different than those above, or for different discount rates, or different installed costs and maintenance costs, please contact IPALaboratories at **info@IPALaboratories.com** for a project-specific lifecycle cost analysis.

100 Clemson Research Blvd. Anderson, SC 29625 | 864.646.8453 | www.TCNAtile.com

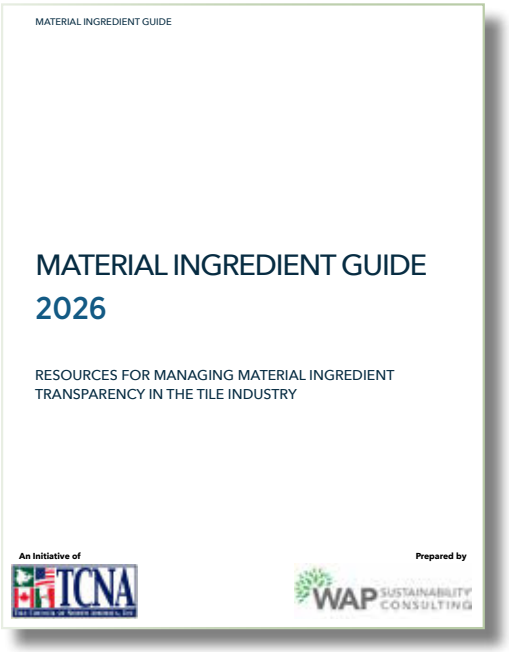
USING INDUSTRY-WIDE GUIDANCE FOR CERAMIC TILE, MORTAR, AND GROUT INGREDIENT REPORTING

TCNA's Material Ingredient Guide is the first of its kind by any building product industry. The guide provides assessment data on common tile industry ingredients that facilitates ceramic tile, mortar, and grout manufacturer conformance to market demands for standardized reporting of the content and chemical makeup of products, or "material ingredient transparency."

Building product suppliers are increasingly required to provide material ingredient transparency. According to the Healthy Building Network, consumers have the "right to know," and it is "the responsibility of the manufacturer" to provide this information. Requirements of LEED, WELL Building, the International Living Future Institute's (ILFI) Living Building Challenge, and other green and healthy building programs add to the demand for material ingredient transparency.

The Material Ingredient Guide provides the following:

- Guidance for manufacturers when they are developing material ingredient reports
- A list of the ingredients most commonly used by North American manufacturers and references to in-depth chemical assessments of these ingredients
- Insights into satisfying green and healthy building criteria



To download the **Material Ingredient Guide**, visit whytile.com/library/material-ingredient-guide

The following manufacturers collaborated in the development of TCNA's Material Ingredient Guide:

Ardex	Interceramic USA
Arto Brick	Ironrock
Bostik	Laticrete
Crest	Porcelanite-Lamosa
Crossville, Inc.	Portobello America
Custom Building Products	Schluter Systems
Dal-Tile Corporation	StonePeak Ceramics, Inc.
Florida Tile	American Wonder Porcelain
Florim USA	

Highlighted in TCNA's Material Ingredient Guide are four steps toward material ingredient transparency: Inventory, Screening and Assessment, Disclosure, and Optimization. Following these steps can support ceramic tile, mortar, and grout manufacturer efforts in developing material ingredient reports that satisfy common A&D criteria, through which there is an opportunity for product contribution to green and healthy building rating programs.

The Inventory Process

The first step for a manufacturer toward material ingredient transparency involves listing all materials purchased to make a product, each identified by a Chemical Abstract Service Registry Number (CASRN). The list should include all material ingredients to 100ppm or 1,000ppm, with 100ppm being more stringent and likely requiring further identification of substances comprising each material ingredient. A product's final list of material ingredients and substances comprising each material is known as the product's content inventory.

TCNA's Material Ingredient Guide provides in-depth instructions on developing a product content inventory, explaining how manufacturers might prefer to target a threshold of 100ppm to maximize conformance to green and healthy building requirements. Furthermore, because manufacturers share many of the same raw materials, those who participated in the development of TCNA's Material Ingredient Guide agreed on a host of ingredients common to ceramic tile, mortar, and/or grout. To facilitate content inventorying efforts, the Material Ingredient Guide lists these ingredients, itemized to the substance level. Each participating manufacturer can obtain CASRN information from this list for the majority of ingredients used in most products.

The Screening and Assessment Process

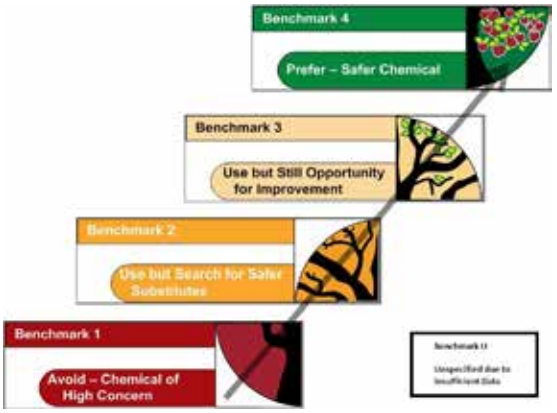
Screening and assessment involve evaluating the toxicological profile associated with the individual CASRN identified for each material ingredient and substance within a product's content inventory. Manufacturers have many screening and assessment options—The Material Ingredient Guide describes *GreenScreen for Safer Chemicals®* as a market-accepted method for construction products as it is referenced by LEED, WELL Building, ILFI, and other green and healthy building programs. GreenScreen has two levels of analysis:

The GreenScreen List Translator™ is a screening method available through free online-automated tools for quickly identifying whether a substance has known health data based solely on 40+ lists of CASRNs mapped to publicly available information. A substance's GreenScreen List Translator score is denoted by the prefix, "LT."

GreenScreen Assessment™ involves preliminary screening of a substance using the GreenScreen List Translator, followed by a full review to fill data gaps using scientific literature and modeling tools. The substance is then assigned a full GreenScreen Benchmark Score, denoted by the prefix "BM."

Overview of GreenScreen BM and LT Scoring (from greenscreenchemicals.org)

GreenScreen Assessment Benchmark (BM) Scoring



GreenScreen List Translator Scoring

LT-1

A given substance would most likely receive a BM-1 score with full GreenScreen Assessment

LT-P1

A given substance would possibly receive a BM-1 score with full GreenScreen Assessment

LT-UNK

There is insufficient information to know if a substance would likely or possibly receive a BM-1 score

USING INDUSTRY-WIDE GUIDANCE FOR CERAMIC TILE, MORTAR, AND GROUT INGREDIENT REPORTING

Although a GreenScreen LT score provides some information on potential hazards associated with a substance, a full GreenScreen Assessment BM score is more accurate and takes precedence over GreenScreen LT scores in green and healthy building programs.

TCNA's Material Ingredient Guide assigns a full GreenScreen Assessment BM score to each of the ingredients commonly used by North American ceramic tile, mortar, and/or grout manufacturers. Additionally, the Material Ingredient Guide states whether each ingredient is included in ILFI's Red List and/or WELL's Restricted Substance List (RSL).

Assessment Results of Common Tile Industry Ingredients Listed in TCNA's Material Ingredient Guide

Ingredient	Screened/Assessed CASRM	Full GreenScreen BM Score	ILFI Red List, WELL RSL
Aluminum Oxide (Al2O3)	1344-28-1	BM-2	No, No
Barium Carbonate (BaCO3)	513-77-9	BM-2	No, No
Boron Trioxide (B2O3)	1303-86-2	BM-1	No, No
Calcium Carbonate (CaCO3)	1317-65-3	BM-3	No, No
Calcium Formate (Ca(HCOO)2)	544-17-2	BM-3	No, No
Calcium Oxide (CaO)	1305-78-8	BM-2	No, No
Chrome Ore (FeCr2O4)	1308-31-2	BM-2	No, No
Gypsum (CaSO4•2H2O)	13397-24-5	BM-3	No, No
Iron Oxide (Fe2O3)	1309-37-1	BM-3	No, No
Magnesium Carbonate (MgCO3)	546-93-0	BM-2	No, No
Magnesium Oxide (MgO)	1309-48-4	BM-3	No, No
Manganese Dioxide (MnO2)	1313-13-9	BM-1	No, No
Methyl ethyl cellulose (C34H66O24)	9032-42-2	BM-2	No, No
Potassium Oxide (K2O)	12136-45-7	BM-2	No, No
Quartz (SiO2)	14808-60-7	BM-1	No, No
Sodium Oxide (Na2O)	1313-59-3	BM-2	No, No
Sulfur Trioxide (SO3)	7446-11-9	BM-2	No, No
Talc (Mg3H2(SiO3)4)	14807-96-6	BM-1	No, No
Titanium Dioxide (TiO2)	13463-67-7	BM-2	No, No
Zinc Oxide (ZnO)	1314-13-2	BM-1	No, No
Zircon (ZrSiO4)	14940-68-2	BM-2	No, No
Zirconium Silicate (ZrSiO4)	10101-52-7	BM-2	No, No
Kaolin Clay	Mixture of SiO2, Al2O3, Fe2O3, TiO2, H2O	See Individual Substance Scores	No, No
Feldspar	Mixture of SiO2, Al2O3, CaO, K2O, Na2O	See Individual Substance Scores	No, No
Portland Cement	Mixture of CaO, SiO2, Al2O3, Fe2O3, SO3	See Individual Substance Scores	No, No
Calcium Aluminate Cement	Mixture of CaO, SiO2, Al2O3, Fe2O3, MgO, TiO2	See Individual Substance Scores	No, No
Ball Clay	Mixture of SiO2, Al2O3, Fe2O3, TiO2, H2O	See Individual Substance Scores	No, No
Wollastonite	Mixture of CaO and SiO2	See Individual Substance Scores	No, No
Shale	Mixture of ball and kaolin clay, SiO2, Feldspar, CaO, Fe2O3, Limestone	See Individual Substance Scores	No, No
Slag	Mixture of CaO, SiO2, Al2O3, and MgO	See Individual Substance Scores	No, No
Limestone	Mixture of CaCO3 & MgCO3	See Individual Substance Scores	No, No
Fly Ash	Mixture of SiO2, Al2O3, Fe2O3, CAO	See Individual Substance Scores	No, No
Soda Lime Borosilicate Glass	Mixture of SiO2, B2O3, Na2O, Al2O3	See Individual Substance Scores	No, No

It is important to recognize products with material ingredients that have scored as BM-1 are very common. While the scoring method classifies BM-1 chemicals as "avoid," the context of such classification, especially whether the likelihood of exposure at various stages in the supply chain is relevant or irrelevant, should be interpreted. Through disclosure of product material ingredients, manufacturers are able to clarify such interpretation.

Disclosure Process

TCNA's Material Ingredient Guide provides two widely accepted disclosure formats for manufacturers to follow when reporting material ingredients in their products: Health Product Declarations (HPD) and Manufacturer Inventories (MI).

HPD is the most recognized and widely adopted material ingredient reporting format for disclosure throughout the building and construction supply chain. By inputting ingredient CASRNs into a free online builder tool developed by the HPD Collaborative, a manufacturer can generate a material ingredient report that conforms to the HPD Open Standard. For each CASRN input into the builder, a GreenScreen LT or BM score (if available) is output to the HPD. Manufacturers have the option to add BM scores to the final report if not already included in the builder.

MI is a generic format for a manufacturer's public disclosure of a product's content inventory. An MI can be completed by a manufacturer in a format deemed suitable by the manufacturer for disclosing product material ingredients and substance screening/assessment results. Because MIs can vary from manufacturer to manufacturer, the TCNA Material Ingredient Guide employs a common framework. If used consistently by ceramic tile, mortar, and grout manufacturers, this common framework can facilitate industry uniformity in MI reporting and minimize confusion.

WAP SUSTAINABILITY CONSULTING

TCNA Material Ingredient Guide participants who incorporate refenced GreenScreen Assessment BM scores into their individual HPDs and/or MIs are provided third-party verification by WAP Sustainability.

TCNA's Material Ingredient Guide provides in-depth instructions and templates for manufacturers to follow when developing an HPD or MI. For both, a manufacturer must first have a product content inventory and screening/assessment results for each material ingredient and substance included in the inventory. The Material Ingredient Guide's GreenScreen Assessment BM scores for the ingredients common to ceramic tile, mortar, and grout, when disclosed, increase transparency. Additionally, when a manufacturer who collaborated in the development of TCNA's Material Ingredient Guide develops an HPD or MI using this information, the disclosure report is eligble for third-party verification (based on an arrangement between TCNA and WAP Sustainability). A third-party verified HPD or MI with full GreenScreen Assessment BM scores is highly credible and facilitates green and healthy building "optimization" by providing a high level of material ingredient transparency.

The Optimization Process

Optimization involves selecting products with high levels of material ingredient transparency. Green and healthy building programs incentivize optimization by awarding points to projects that use products for which material ingredient information has been inventoried, screened and assessed, and disclosed following steps such as those detailed in the Material Ingredient Guide.

USING INDUSTRY-WIDE GUIDANCE FOR CERAMIC TILE, MORTAR, AND GROUT INGREDIENT REPORTING

Scan the QR code for the online version of TNC, where updates to LEED v5 and related sustainability credits will be reflected as they become available.

LEED V4.0 and V4.1

Under the credit category Material Ingredients, up to two points toward LEED certification of a building can be earned by using products that exhibit material ingredient transparency.

Option 1 (one Point) Material Ingredient Reporting	AND/ OR	Option 2 (one Point) Material Ingredient Optimization
One point can be earned for using at least 20 different permanently installed products with any of the LEED-specified material ingredient reporting formats to disclose product ingredients to at least 1,000ppm. HPD and MI reporting formats are both acceptable, thus ceramic tile, mortar, and grout products with material ingredient reports per either reporting format are eligible for contribution to LEED's Material Ingredient Reporting credit. A single product counts 1x toward the 20-product threshold if the steps outlined in TCNA's Material Ingredient Guide are followed toward preparing a product's material ingredient inventory, listing each ingredient's GreenScreen LT or BM score, and disclosing this information through publishing an HPD or MI. It should be noted that following the Material Ingredient Guide's recommended more stringent inventory threshold of 100ppm means that the 1,000ppm threshold for LEED's Material Ingredient Reporting credit is inherently satisfied.		One point can be earned for using five different permanently installed products with any of the LEED-specified material ingredient optimization pathways, including the GreenScreen Assessment Pathway: A single product counts 1x toward the five-product threshold if: • Material ingredients have been inventoried to 100ppm, and • GreenScreen Assessment BM scores are assigned to at least 75% (by weight) of the listed substances, and • The information is disclosed through publishing an HPD or MI, and • The HPD or MI has been third-party verified. Following the same criteria above, a single product counts 1.5x toward the ve-product threshold if BM scores are assigned to at least 95% (by weight of the listed substances) of the listed substances with no BM-1 hazards and no LT-1 hazards for the remaining 5% of listed substances. Following the steps outlined in TCNA's Material Ingredient Guide, manufacturers are encouraged to determine if 75% or 95% of the substances listed in a product-specic content inventory are included in the list of common industry ingredients. Referencing this information in an HPD or MI and achieving third-party verication from WAP Sustainability can satisfy the requirements of this credit. If BM scores are not available for at least 75% of the listed substances, or if material ingredients have been inventoried to 1,000ppm instead of 100ppm, a single product counts 0.5x toward the ve-product threshold if the manufacturer has developed a detailed action plan to mitigate or reduce known hazards in the product. TCNA's Material Ingredient Guide provides a breakdown of LEED's action plan criteria, including a template for manufacturers to follow.

WELL Building

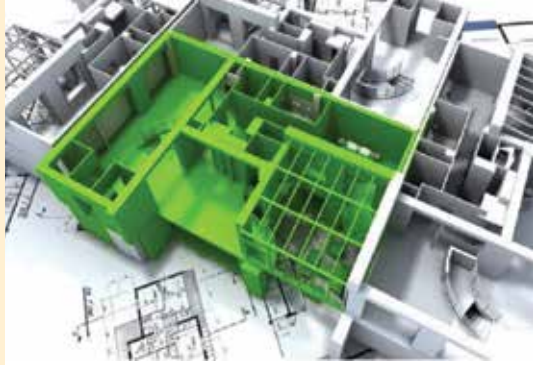
Under the credits ("features") X07 – Material Transparency and X-08 – Materials Optimization, up to five points toward WELL certification of a building can be earned by using products that exhibit material ingredient transparency.		
WELL Feature X07 – Material Transparency	AND/OR	WELL Feature X08 – Materials Optimization
Part 1 – Disclosed Ingredients (one point): One point can be earned if material ingredient information is disclosed for 25 permanently installed products (including interior finishes, materials, and furnishings) to 1,000ppm using any of the WELL-specified material ingredient reporting formats. **Part 2 – Enhanced Ingredient Disclosure (second point):** A second point can be earned if material ingredient information is disclosed for 15 permanently installed products (including interior finishes, materials, or furnishings) to 100ppm using any of the WELL-specified material ingredient reporting formats. **Part 3 – Third-Party Verified Ingredients (third point):** A third point can be earned if disclosed ingredient information, per Part 1 and/or 2, achieves third-party verification. WELL accepts the HPD and MI reporting formats, thus material ingredient reports developed according to TCNA's Material Ingredient Guide and the recommended inventory threshold of 100ppm are eligible for contribution to Parts 1 and 2 of this feature. Furthermore, with third-party verification available from WAP Sustainability to TCNA Material Ingredient Guide participating companies, contributions toward Part 3's third point is achievable for ceramic tile, mortar and grout.		**Part 1 – Enhanced Chemical Restrictions (one point)** One point can be earned if material ingredient information is disclosed for at least 25 permanently installed products including interior finishes, materials, and furnishings) to at least 100ppm, and if the disclosure has been optimized using any of the WELL-specified optimization strategies. Material ingredient reports conforming to LEED Material Ingredient Optimization criteria are acceptable for contribution to this feature. **Part 2 - Select Optimized Products (second point)** A second point can be earned if material ingredient information is disclosed for 15 permanently installed products (including interior finishes, materials, or furnishings) are certified under one of the WELL-specified certifications. An MI or HPD that has been prepared for a ceramic tile, mortar, or grout product per TCNA's Material Ingredient Guide can contribute if: substances are reported to 100ppm, GreenScreen Assessment BM scores have been assigned to at least 75% (by weight) of the reported substances, and third-party verification has been achieved. INTERNATIONAL WELL BUILDING INSTITUTE™

USING INDUSTRY-WIDE GUIDANCE FOR CERAMIC TILE, MORTAR, AND GROUT INGREDIENT REPORTING

Living Building Challenge (LBC)

Within ILFI's LBC 4.1 standard, material ingredient requirements are integrated under the Materials Petal, covering Imperatives 12, 13, and 14 toward LBC certification of a building.	
Imperatives 12 and 14	12: The project must contain one Declare label product per 200 square meters (sm) of Project Floor Area, up to twenty distinct products from five manufacturers. All other product manufacturers not currently in Declare must, at a minimum, receive a letter requesting they disclose their ingredients and identify any Red List content. 14: All projects must contain one Declare product per 100sm of Project Floor Area, up to forty products, and advocate to all manufacturers that are not in Declare that they register their products in the Declare database. Declare is an ingredient label for building products, similar to an HPD or MI, where manufacturers disclose the ingredients in their products. The Living Product challenge is a third-party verification program, developed by ILFI, requiring that a product's Declare label is free of ILFI Red List chemicals and that the product's ingredients have undergone full Green Screen Assessments. Using ceramic tile, mortar, and grout can help LBC project teams meet imperatives 12 and 14. Although steps toward developing a Declare label are not described in TCNA's Material Ingredient Guide, manufacturers can use product ingredient information contained within an HPD or MI to generate a Declare label using ILFI's online software. Furthermore, ceramic tile, mortar, and grout products may be candidates for Living Product Challenge certification as none of the common chemicals listed in TCNA's material ingredient guide appear on ILFI's Red List, and all have undergone a full GreenScreen Assessment.
Imperative 13	90%, by cost, of a building project's products must be free of chemicals included in ILFI's Red List. LBC project teams may consider ceramic tile, mortar, and grout products to facilitate meeting Imperative 13 as none of the common chemicals listed in TCNA's Material Ingredient Guide appear on ILFI's Red List. LIVING BUILDING CHALLENGE

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.



G2 GREEN SQUARED CERTIFIED®

Guide to Green Squared®:

The Tile Industry's Standard and Certification Program for Product Sustainability

2026

Stress-Free Sustainability

GREEN SQUARED CERTIFIED®

Glass Tile
Ceramic Tile
Installation Products

CREDITS

LEED v4.1

Green Globes

NAHB National Green Building Standard

COMPLIANCE

International Green Construction Code

GSA Facilities Standards for Public Buildings

ASHRAE Standard for the Design of High-Performance Green Buildings

CONFIDENCE

Life Cycle-Based, Multi-Attribute Criteria

Verification by Leading Certification Bodies

Listed in National Institute of Building Sciences' Whole Building Design Guide

Recommended by the US EPA for Federal Purchasing

For certified product lines, visit greensquaredcertified.com

CONTENTS

WHAT IS **GREEN SQUARED®?**

Green Squared® is the world's only multi-attribute sustainability standard and certification program for tile and the associated products needed to install it.

When you see the Green Squared Certified® mark, it means a product meets the broad array of rigorous sustainability requirements of the American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles and Tile Installation Materials (ANSI A138.1).

Including raw material extraction, end of product life management, and all life cycle stages in-between, Green Squared is a true cradle-to-grave performance standard that eliminates the need to cross evaluate single-attribute sustainability claims.

Products independently verified as conforming to the Green Squared standard may bear the Green Squared Certified mark. To be in conformance, products must meet a battery of requirements and electives, as set forth in the standard.

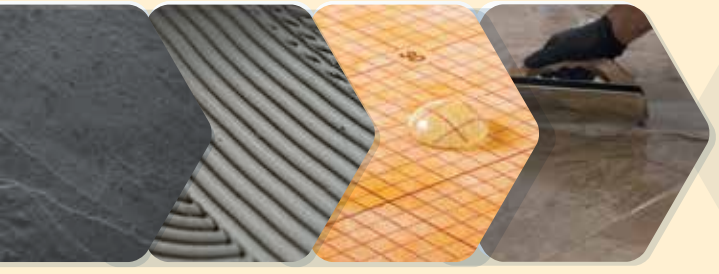
Qualities of the Green Squared Standard

Thorough Green Squared incorporates a full range of sustainability issues into one standard, one mark — allowing for easy marketplace recognition of sustainable tiles and tile installation materials.

Standardized Criteria Green Squared establishes performance-based thresholds, setting the bar for technical specification of sustainable tiles and installation materials.

Clarity As the tile industry's own sustainable product certification program, Green Squared facilitates increased uniformity and decreased confusion in green marketing.

Opportunity By passing rigorous third-party evaluation criteria, certification to the Green Squared standard confers a high level of credibility and a smooth, clear, and responsible path for products to be specified in green building projects.



Sustainable Systems Green Squared addresses the components of a tile installation, allowing the specification and installation of systems of certified conforming products.

THE STANDARD

Developed by an ANSI-accredited committee of green building professionals, manufacturers, distributors, installers, and other stakeholders, the Green Squared standard, ANSI A138.1, contains a spectrum of multi-attribute environmental and social criteria.

PRODUCTS COVERED

Green Squared covers a variety of products, including ceramic and glass tiles, mortars, grouts, backerboards, membranes, and other installation materials.

THIRD PARTY CERTIFICATION

Manufacturers seeking to have their product(s) certified can apply to either of two internationally-recognized Green Squared certification bodies.

SCS global SERVICES

IPA International Product Assurance LABORATORIES

UL Solutions

PRODUCT LABELING

Once a product is third-party certified as meeting the ANSI A138.1 standard, the certification body awards use of the Green Squared Certified® logo on products, packaging and/or associated literature.

Multi-Attribute Sustainability
(condensed from standard)

Environmental Product Characteristics	Recycled Content/Reclaimed Waste Content
	Indigenous Raw Goods
	Environmental Packaging
	Durability
	Low Emissions
	Environmental Cleaning & Maintenance
	Solar Reflectance Index (SRI)
	Light Reflectance Value (LRV)
	Sound Abatement
	Third Party LCA & EPD
	Participation in LCA Database Initiatives
Environmental Product Manufacturing and Raw Material Extraction	Particulate Emissions
	Combustion and Fuel Usage
	Raw Goods Sourcing & Extraction
	Outsourced Packaging & Manufacturing Services
	Environmental Management Plans & Systems
	Utility Usage
	Renewable Energy
	Manufacturer Waste Diversion/Minimization
	Shipping Material Waste Minimization
End of Life Product Mgmt.	Manufacturer Guidelines on Clean Fill Usage
	Post-Life Material Waste Minimization
Progressive Corporate Governance	Social Responsibility Strategy
	Labor Law Compliance
	Environmental Regulation Compliance
	Health & Safety Regulation Compliance
	Voluntary Participation in Health/Safety Programs
	FTC Green Guides Compliance
	Continuous Community Involvement
	Public Disclosure
	Sustainability Reports
	Certified "Green" Facilities
Innovation	"Above & Beyond" Standardized Criteria
	Innovative Sustainability Technologies
	Carbon Footprint Awareness/Reduction Strategy

THE GREEN SQUARED® STANDARD
ANSI A138.1

Environmental Product Characteristics

The first section of ANSI A138.1, Environmental Product Characteristics, standardizes product attributes such as the amount of recycled content, level of volatile organic emissions, amount of indigenous raw materials, etc.

Three levels of recycled content and reclaimed waste are defined in the standard. Level one is mandatory for conformance, and levels two and three are elective. Thresholds vary depending on product type.

There are also three standardized levels of indigenous raw material content. Recognizing the environmental burden from transportation, indigenous raw materials are those extracted within 500 miles of the manufacturing site. If transported by rail or sea, the limit is 2000 miles. All three levels are elective.

There are five standard attributes for sustainable packaging. All five are elective, but it is mandatory that at least one be achieved:

- Minimal packaging (packaging cannot exceed a specified percentage of the product weight)
- Recyclable packaging (a specified percentage of the packaging is recyclable)
- On-site reusable packaging (100% reusable on site)
- Biodegradable or compostable packaging (meets specific ASTM biodegradability criteria)
- Recycled content packaging (contains a specified percentage of recycled content)

Mandatory for conformance to ANSI A138.1, a product must meet industry standards for durability and performance. For example, tile must comply with ANSI A137.1. Also mandatory for conformance, a product shall have low (for installation products) or no (for tile) volatile organic compound (VOC) emissions. Environmentally-friendly maintenance instructions must also be available.

Finally, as elective options for conformance to A138.1, criteria for solar reflectance index (SRI), light reflectance value (LRV), and sound abatement are all established. Also, electives for life cycle assessment (LCA) and/or environmental product declaration (EPD) are available.

Environmental Product Manufacturing and Raw Material Extraction

The second section of ANSI A138.1, Environmental Product Manufacturing and Raw Material Extraction, standardizes sustainable production practices.

Mandatory for a product to conform to the standard, buildings containing process equipment shall not allow visible particulate matter (PM) emissions. Additionally, there are four standardized PM pollution control levels based on grain size; the first is mandatory and other three are elective.

It is mandatory that the only types of fuels used are natural gas, LP gas, landfill generated methane, or bio-based fuel. The usage of landfill generated methane or bio-based fuel can earn elective credits.

Elective credits can also be achieved through the use of low nitrogen oxide (NOx) burners and acid gas controls.

Also mandatory for a product to conform, the manufacturer of that product must have a written procurement policy for its raw material suppliers addressing social issues, environmental issues, and applicable requirements for mining laws. Additionally, the manufacturer is expected to maintain a list of all materials used to manufacture the product.

As an elective, the manufacturer may choose to enter into a sustainability-based buying agreement with the raw material suppliers contributing, in aggregate, at least 90% or more of the product by weight.

For outsourced services, such as packaging or additional manufacturing services, manufacturers must require that their service providers have written sustainability policies.

Manufacturers are required to have an environmental management plan that addresses waste minimization, lighting efficiency, heating fuel usage, electricity consumption, and water conservation. There are elective options for minimal water discharge, renewable energy usage, cogeneration, heat recovery or combined heat and power integration, ASHRAE auditing, and ISO 14001 environmental plan registration.

Finally, as electives, several innovative criteria for waste diversion are established. These include incorporation of waste into other manufacturers' products or beneficial reuse projects, donation of finished products to charitable organizations in lieu of disposal, and recycling/reuse of incoming shipping materials.

End of Product Life Management

This section of the standard opens with the following preface:

Inherently, tile products are durable, inert, and intended to have life spans as long as the buildings in which they are installed. They are engineered to serve as permanent finishes capable of outlasting multiple generations of building occupants. Tile product end of life management is pertinent to building demolition waste and small quantities of waste generated during construction.

It is perhaps self-evident—but worth noting—that a product with a long lifetime is more sustainable than a similar product with a short lifespan. When considering the environmental, social, and economic sustainability of a product, all relevant impacts are repeated each time that product is replaced. Ideally, a product's expected service life is at least as long as the building in which it is installed, in which case it's impacts are considered only once.

Although a tiled finish is inherently durable and typically desirable for a lifetime, there are instances in which end of product life must be addressed. Thus, there are end of product life management electives in ANSI A138.1 that are intended for instances where buildings are demolished, scrap waste is generated during construction, or a remodel occurs.

The first end of product life management elective option requires that the product be eligible for use as clean fill. To satisfy this elective, a manufacturer shall provide documentation verifying that the product is inert and solid such that it can potentially be considered along with other eligible construction and demolition debris for state and local Clean Fill acquisition initiatives.

A second elective requires an end of product life collection plans. To satisfy this elective, the manufacturer shall establish and implement a plan that addresses the collection, processing, and recycling or re-tasking of a product for other purposes once the product's useful life is completed.

Progressive Corporate Governance

The fourth section of ANSI A138.1 specifies criteria for Progressive Corporate Governance.

Mandatory for conformance to the standard, a manufacturer shall have a written and implemented social responsibility strategy which addresses at least the following: labor law compliance, forced labor prohibitions, child labor prohibitions, environmental regulation compliance, health and safety regulation compliance, and community involvement.

As an elective, the manufacturer may choose to participate in a voluntary safety program such as OSHA Safety Consultation, Voluntary Protection Program (VPP), or OHSAS 18001.

It is mandatory that all green marketing claims made by the manufacturer be in compliance with the Federal Trade Commission (FTC) Fair Packaging and Labeling Act (FPLA) Green Guides (publicly available) that indicate how the FTC applies Section 5 of the FPLA, prohibiting unfair or deceptive acts or practices in environmental claims.

As an elective, the manufacturer may choose to regularly engage in its community, building upon the community involvement plan established in its mandatory social responsibility strategy.

Also, as an elective, the manufacturer may publicly disclose on an annual basis one of the following: utilities consumption, registered Environmental Management System (EMS) data, or Life Cycle Assessment (LCA) data.

An elective credit is also available if a manufacturer provides a detailed sustainability report each year, conforms to the requirements of the Global Reporting Initiative (GRI), or is selected for inclusion in the Dow Jones Sustainability Index (DJSI).

If a manufacturer has at least one facility with LEED® or Green Globes certification, an elective credit is also available for that.

Additionally, manufacturers are required to have a program in place that demonstrates continued conformance to the specified criteria of ANSI A138.1/Green Squared for all pertinent products.

Innovation

Technological advancement and outstanding achievement, well beyond what is required, can be key to the development of sustainable products and operations. ANSI A138.1 allows products to achieve conformance, in part, through innovation. This may involve exceptional performance well above the requirements set forth in other sections of the standard, and/or innovative performance recognized by the ANSI ASC A108 Committee in categories not otherwise addressed by the standard.

A product may earn up to two electives through exceptional conformance if quantitative criteria already addressed by the standard are greatly exceeded. Either, the most stringent threshold already established for a specific criterion must be exceeded by one and a half times, or certain specific requirements defined in the standard's Appendix C must be met.

For sustainability attributes not directly addressed by the standard, an evolving list of approved innovations is managed by the ANSI ASC A108 Committee. Innovations not included in this list can be added if they are submitted to and approved by the Committee. This can include ecological attributes or processes not otherwise addressed by the standard or innovative corporate governance.

A product may also earn a fourth innovation elective if the product's carbon footprint is provided and prescriptive measures were taken to reduce either the product's or the manufacturing organization's greenhouse gases.

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THIRD-PARTY CERTIFICATION
GREEN SQUARED CERTIFIED®

Background on Green Squared Certification

Green Squared® certification was developed by TCNA for independent third-party certifiers to assess if products are in conformance with ANSI A138.1. Products certified under Green Squared may be labeled using the Green Squared Certified mark. This easily-recognizable mark helps architects, designers, and end users choose products, while resting assured that the products they choose meet the industry's broad range of sustainability criteria.

The Green Squared framework for product evaluation and certification is in accordance with ISO Type 1 environmental labeling and declaration requirements (ISO 14024). With so many different brands of green today, Green Squared certification provides authenticity and conveys that the product certified is the real deal. In a marketplace wary of unsubstantiated product sustainability claims, Green Squared third-party validation is provided by well-known and widely-recognized certification bodies.

The Green Squared Certification Process

A manufacturer seeking Green Squared certification for various products they make applies directly to a certification body approved under the Green Squared program. The certification body then makes necessary arrangements with the manufacturer to evaluate if the products meet the ANSI A138.1 standard. This evaluation, which is in accordance with the Green Squared Certification Program Criteria, includes a comprehensive and objective review of the products and the associated manufacturing facility. Based on this evaluation, for those products that meet ANSI A138.1, the certification body authorizes the use of the Green Squared Certified mark.

Global Applicability

The ANSI A138.1 standard, and certification of conformance to that standard (i.e., Green Squared certification) were developed specifically to be relevant to products no matter where in the world they are produced. Developed to meet the sustainability needs of the North American marketplace, the Green Squared standard and certification program provide all producers, foreign and domestic, with a clear benchmark for designing sustainable products that can be accepted by North American green building programs.

Six Steps of Certification

Here's what to expect when pursuing Green Squared® certification of your product(s):

1 APPLICATION PROCESS

Manufacturer interested in having a product certified applies directly to an authorized Green Squared certification agency.

Certification Agencies: SCSglobal SERVICES, IPA International Product Assurance LABORATORIES, UL Solutions

2 EVALUATION

The certification process involves the following in determination of ANSI A138.1 conformance:

- General evaluation of the applicant organization
- Product evaluation
- On-site facility evaluation

3 CONFIDENTIALITY

All proprietary information remains confidential between the certification agency and the manufacturer.

4 CERTIFICATION

- Green Squared Certified® mark awarded by certification agency
- Scope of certified products determined by certification agency
- Certifications valid for a five-year period
- Surveillance audits each year
- Re-certification after five years

5 PRODUCT LISTING

- Agency lists all certified products
- Certified products also listed on GreenSquaredCertified.com
- Certified product data syndicated by Ecomedes to Fulcrum, as well as to many public and private A&D purchasing libraries

6 USING THE MARK

- Directly on certified products
- Packaging of certified products
- Promotional literature published about certified products

G2 GREEN SQUARED CERTIFIED®

SPECIFYING GREEN SQUARED®
GREEN BUILDING STANDARDS, CODES, AND RATING SYSTEMS

LEED v4.1

Under the LEED pilot credit, *Certified Multi-attribute Products and Materials*, a point toward LEED certification can be earned by using products from manufacturers who have confirmed multiple environmental attributes through an independent, third-party certification, such as Green Squared®.

Scan the QR code for the online version of TNC, where updates to LEED v5 and related sustainability credits will be reflected as they become available.

In order to achieve this point, at least 25%, by cost, of the total value of permanently installed products in a project must have earned certification under any of the following programs: Level® certification for furniture, NSF 140 certification for carpet, NSF 332 certification for resilient flooring, Green Squared certification for tiles and tile installation materials, UL 100 certification for wall board, NSC 373 certification for natural stone, NSF 343 for wallcoverings, and NSF 347 for roofing membranes.

Additionally, the product literature must disclose which sections of the relevant multi-attribute sustainability standard were met, and an LCA (life-cycle assessment) conforming to ISO 14044 must be available, either as a component of or in addition to the product's multi-attribute certification.

Tiles or installation materials that are Green Squared Certified® and for which an LCA is available (or which meet section 3.8.1 of Green Squared®/ANSI A138.1) can contribute:

- 50% of the total product cost for baseline certification
- 75% of the total product cost if ANSI 138.1 Level 2 criteria for recycled/reclaimed content and/or Level 2 criteria for indigenous raw materials were met as part of the certification
- 100% of the total product cost if ANSI A138.1 Level 3 criteria for recycled/reclaimed content and/or Level 3 criteria for indigenous raw materials were met as part of the certification

Sample calculation for a project with $1,000,000 in permanently installed products, including $80,000 of Green Squared Certified tile and $20,000 of Green Squared Certified mortar that meets ANSI A138.1 Level 3 criteria for indigenous raw materials.

Tile installation contribution to the 25%, by cost, of the total value of permanently installed products in the project

$$\frac{(0.5)\ (\$80k \text{ tile value}) + (1.0)\ (\$20k \text{ mortar value})}{\$1M \text{ (all materials value)}} = 6\%$$

In the example above, the contribution of Green Squared Certified® tiles and installation materials toward the 25% minimum would be 6%.

Green Globes ANSI/GBI 01-2024 If New Building

Under the provisions of Section 5.2, *ANSI/GBI 01-2024 Product Life Cycle*, using Green Squared Certified® products can contribute toward the 29 available points for using products with EPDs or that are third-party certified to multi-attribute standards. Points are awarded for using products with:

EPDs: Generic or Proprietary AND/OR Third-Party Verified Proprietary Life-Cycle Assesments AND/OR Third-Party Certifications to Multiple Attribute Standards

Points are awarded based on the number of products used, as follows:

# of Products	Points	# of Products	Points
≥40 products	29 pts	≥25 to ≤27 products	11 pts
≥38 to ≤39 products	26 pts	≥23 to ≤24 products	8 pts
≥35 to ≤37 products	23 pts	≥21 to ≤22 products	7 pts
≥33 to ≤34 products	20 pts	≥18 to ≤20 products	6 pts
≥30 to ≤32 products	17 pts	≥15 to ≤17 products	5 pts
≥28 to ≤29 products	14 pts	<15 products	No pts

Without limit, using Green Squared Certified tiles or installation materials will contribute to this requirement. Products that also have an LCA or EPD can contribute double.

Sample calculation for a project with 6 Green Squared Certified tiles, 6 Green Squared Certified grouts, 1 Green Squared Certified mortar and 9 other products certified under their respective industry programs:

13 total tiles/tile installation products + 9 other compliant products = 22 total products (7 points)

Using the above example, tile's contribution is 13 out of 22 products, or 59%.

Sample calculation for the same project, but with tile that is Green Squared Certified and has an LCA or EPD:

$$\frac{[(13 \text{ Green Squared Certified products with LCA or EPD}) \times 2] + 9 \text{ other compliant products}}{35 \text{ total products (19 points)}}$$

Using the above example, although 35 total products are achieved, only 30 are required to obtain the maximum points tier. Toward the threshold, tile's contribution is 26 out of 30 products, or 87%.

International Green Construction Code (IgCC) Powered by ASHRAE Standard 189.1

About IgCC: An initiative of the International Code Council (ICC), IgCC was developed as model code language for states and municipalities to establish baseline sustainability requirements for new and existing commercial buildings.

About ASHRAE 189.1: An ANSI-accredited standard, ASHRAE 189.1 was written to be incorporated into governing jurisdictions' codes and ordinances for commercial buildings and enforced by building officials and inspectors.

IgCC and ASHRAE Standard 189.1 are now integrated into a single model code and standard for high-performance buildings.

For compliance with the IgCC, specifically Section 901.5.1.4 (ASHRAE 189.1 Section 9.5.1.4), *Third-Party Multi-Attribute Certification*, at least five different products installed in the building project at the time of issuance of certificate of occupancy shall be in accordance with one or more standards listed under section 901.5.1.4.

G2 GREEN SQUARED CERTIFIED®

NAHB National Green Building Standard

Commonly referred to as ICC 700, NAHB's National Green Building Standard is an ANSI-accredited specification for residential construction. Green Squared Certified® tiles and installation materials can help achieve points under section 612.2, Sustainable Products.

Three points are awarded if 50% or more, based on square footage, of all tiles installed in a project have been Green Squared Certified. In order for such tiles to qualify, tile must make up at least 30% of the floor or wall area of the project.

Three points are awarded if 50% or more, based on square footage, of all tile installed in a project have been Green Squared Certified. In order for such tiles to qualify tile in general must make up at least 30% of the floor or wall area of the project.

Release date: January 2026

Green building standards and rating systems are living documents, and the consensus regarding their use and interpretation is ever-evolving. Check for updates to *Tile: The Natural Choice* at www.TCNAtile.com.

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TCNA
Tile Council of North America, Inc.

Guide to EPDs for Ceramic Tile, Mortar, and Grout Made in North America

2026

*Note: The industry-wide EPD for ceramic tile and the North American flooring PCR are being updated. The current ceramic tile EPD is valid through May 30, 2026. Access the online version of TNC for updates.

IPA℠
International Product Assurance
LABORATORIES

Green Squared® Certification

Green Squared®–the world's first multi-attribute certification for tile and tile installation products. Certified by ANSI A138.1 and trusted in major green building programs including LEED, NAHB, and Green Globes.

GET CERTIFIED

CONTENTS

TOTAL TRANSPARENCY
EPDs FOR NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

The environmental product declarations (EPDs) for North American-made ceramic tile, mortar, and grout provide a comprehensive overview of how these products impact the environment. The combination of the three provides environmental impact data, per square meter, of the main materials used to set tile.

The EPDs address the most important environmental considerations affecting the well-being of the planet and those who call it home—specifically, global warming, fossil fuel resource depletion, acidification, smog formation, eutrophication, and ozone depletion.

And, because EPDs and product environmental transparency are increasingly required in green construction standards and rating systems, specifying ceramic tiles, mortars, and grouts covered by the EPDs can help achieve green building points and meet transparency requirements. In fact, as most green building standards, codes and rating systems provide incremental credit for the use of each product covered by an EPD, using tile in a project, with the accompanying mortar and grout, means that a single tile installation using materials covered by North American EPDs could potentially contribute "three times (3X)."

The Credibility Process

When selecting construction materials, it's important to know decisions are supported by reliable, life cycle-based sustainability information. For the North American-made Ceramic Tile, Mortar, and Grout EPDs, the life-cycle assessments were independently performed by WAP Sustainability Consulting, all

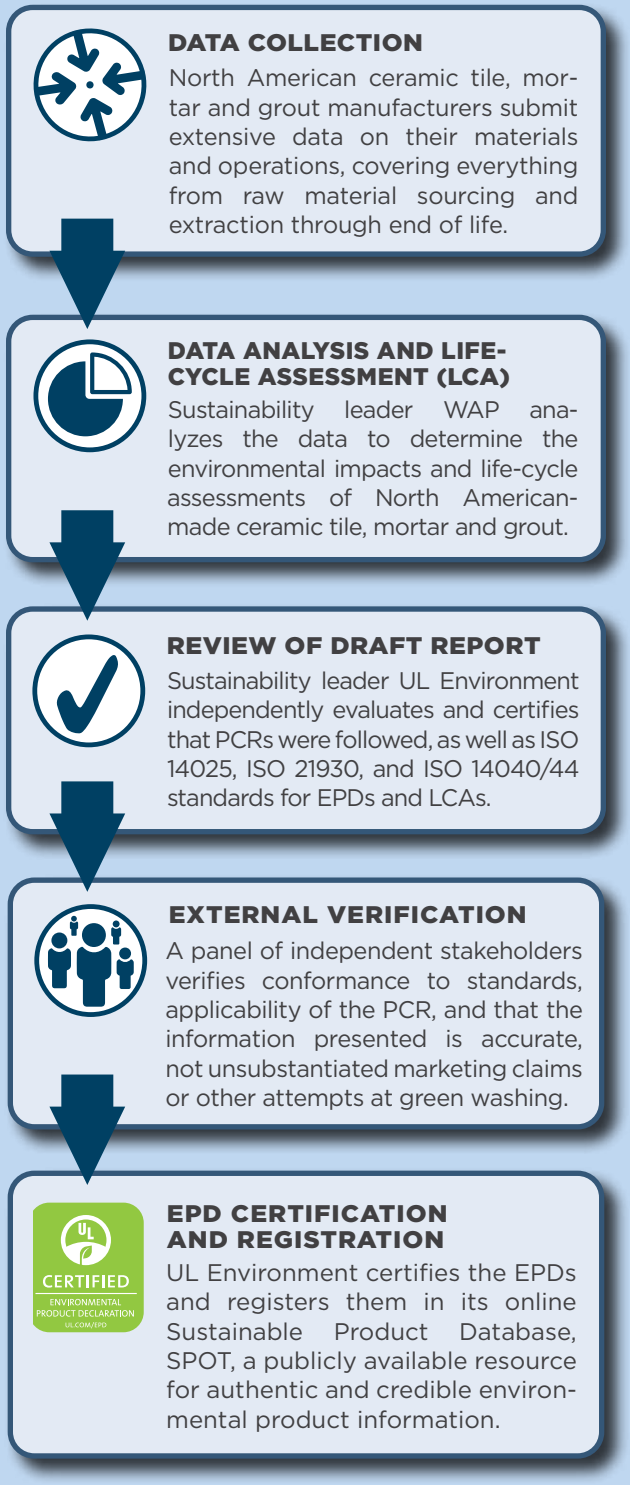
per the ISO standard 14040/44, *LCA Principles, Framework, Requirements, and Guidelines.* Additionally, UL Environment, as Program Operator, verified the validity of the LCAs and certified the requirements of ISO 14025, *Principles and Procedures for EPDs*, and ISO 21930, *Core Rules for EPDs of Construction Products and Services,* were met. Conformance to these standards, plus certification of the EPDs by a globally recognized sustainability leader, ensures the EPDs are accurate, not unsubstantiated marketing claims or other attempts at "green washing."

To produce the EPDs, the participating manufacturers provided extensive data on their materials and operations and participated in a cradle-to-grave evaluation of their products, from raw material sourcing/extraction, through manufacturing, delivery, installation, use, and end of life.

For each EPD, the specific environmental impacts measured, and the methodology for measuring those, are dictated by a Product Category Rule (PCR). For the tile EPD, the North American PCR, UL 10010-7 Part B: Flooring EPD Requirements v2.0, was followed. Using product category rules developed for all flooring allows tile covered by the EPD to be compared to other flooring products evaluated under the same PCR.

For the mortar and grout EPDs, the North American PCR, UL Part B: Cement-Based Grout, Adhesive Mortar, and Leveling Underlayment EPD Requirements v1.0, was followed.

The standardized reporting of tile, mortar and grout required by the PCRs additionally provides transparency and prevents green washing, as all parameters and impacts in the PCR must be reported, not just those areas in which a product performs well.



TOTAL TRANSPARENCY
EPDs FOR NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

Products Covered by the EPDs

Because the EPDs are based on aggregated data from all participating manufacturers, they are "generic" or "non-proprietary" EPDs. As most major North American tile industry manufacturers participated, over 85% of North American-made products are covered: 3.4 billion square feet of tile and 1 billion kilograms of mortar and grout.

To find out if a specific product line is covered by a certified EPD, contact the participating manufacturers.

Participating Tile Manufacturers

American Wonder Porcelain
Arto
Crossville
Dal-Tile Corporation
Del Conca USA
Florida Tile
Interceramic
Ironrock
Porcelanite Lamosa
Portobello America
Quarry Tile Company
StonePeak Ceramics
Vitromex de Norteamérica

Participating Grout and Mortar Manufacturers

Ardex
Bostik
Cemenquin/Cement Pro
Cemix/Texrite
Crest
Custom Building Products
HB Fuller/Tec
Interceramic
Laticrete
Mapei
Parex
Schluter

The EPDs were initiated by Tile Council of North America (TCNA) and its participating members, with data analysis and modeling by WAP Sustainability and third-party, independent certification by UL Environment.

TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

WAP SUSTAINABILITY CONSULTING

UL Solutions

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

Download the EPDs at TCNAtile.com

Just as nutrition labels inform the calorie conscious on food choices, an EPD informs with respect to sustainability. When using the North American-made Tile EPD alongside other flooring products' generic EPDs, one thing is clear: Overall ceramic tile has the lowest 75-year environmental impact per square meter. Similarly, the industry-wide EPDs for North American-made mortar and grout report very low 75-year environmental impacts per installed square meter.

Environmental Facts

Functional unit: 1 m^2 of Ceramic Tile Floor Covering
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT	Total
Global Warming Potential (kg CO_2 eq)	19.6
Acidification Potential (kg SO_2 eq)	0.037
Ozone Depletion Potential (kg R11 eq)	6.7E-10
Smog Potential (kg O_3 eq)	0.8
Eutrophication Potential (kg N eq)	0.003
Fossil Resource Depletion (MJ)	32

OTHER INFORMATION	
Zero VOCs	
Boundaries	Cradle to Grave
Recycled Content	Varies
Green Squared Certification®	Some Tiles

Ceramic Tile Ingredients: Clay (69.8%), Sand (6.2%), Talc (1.1%), Feldspar (11.3%), Scrap (6.5%), Frit (0.4%), Calcium Carbonate (1.5%), Ash (1.4%), Additives (0.7%), Ink (0.2%), Glaze (1.1%)

Visit **www.TCNAtile.com** for further information.

Environmental Facts

Functional Unit: 1 m^2 of Installed Grout
(Application Rate, 0.212 kg/m^2)
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT	Total
Global Warming Potential (kg CO_2 eq)	0.192
Acidification Potential (kg SO_2 eq)	0.000528
Ozone Depletion Potential (kg R11 eq)	7.12E-12
Smog Potential (kg O_3 eq)	9.06E-03
Eutrophication Potential (kg N eq)	3.59E-05
Fossil Resource Depletion	0.26

OTHER INFORMATION	
VOC Emissions-CDPH Section 01350	Meets
Recycled Content	Varies
Green Squared® Certification	Some Grout
ANSI A118.6, ANSI A118.7	Meets

Tile Grout Ingredients: Sand, White Cement, Limestone, Grey Cement, Calcium Aluminate, Calcium Formate, Other Additives

Visit **www.TCNAtile.com** for further information.

Environmental Facts

Functional Unit: 1 m^2 of Installed Tile Mortar
(Application Rate, 4.07 kg/m^2)
Reference Service Life (RSL): 75 Years

75 YEAR IMPACT ASSESSMENT	Total
Global Warming Potential (kg CO_2 eq)	2.9
Acidification Potential (kg SO_2 eq)	0.0077
Ozone Depletion Potential (kg R11 eq)	2.53E-10
Smog Potential (kg O_3 eq)	0.144
Eutrophication Potential (kg N eq)	6.29E-04
Fossil Resource Depletion	4.05

OTHER INFORMATION	
VOC Emissions-CDPH Section 01350	Meets
Recycled Content	Varies
Green Squared® Certification	Some Mortar
ANSI A118.1, ANSI A118.4, ANSI A118.11, ANSI A118.15, ISO 13007	Meets

Tile Mortar Ingredients: Sand, Calcium Carbonate, Grey Cement, White Cement, Ethylene Vinyl Acetate, Admixture, Cellulose Ether, Other Additives

Visit **www.TCNAtile.com** for further information.

CREDITS AND COMPLIANCE
NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

Scan the QR code for the online version of TNC, where updates to LEED v5 and related sustainability credits will be reflected as they become available.

LEED v4.1

Under the credit category Building Product Disclosure and Optimization–Environmental Product Declarations, up to 2 points toward LEED certification can be earned by using products with EPDs, such as North American-made ceramic tile, mortar and grout.

Option 1 (1 Point)
Environmental Product Declaration

AND/OR

One point can be earned for using at least 20 different permanently installed "products," which are construction materials that meet one of the specified disclosure criteria and are therefore eligible for the valuation associated with that disclosure criteria. Valuations for such materials are awarded on a per-material basis, and this LEED point is earned by using enough materials that their combined valuations total at least 20 "products."

Disclosure Criteria	Valuation
Proprietary LCA (Internally Reviewed)	1 product
Proprietary EPD (Internally Reviewed)	1 product
Generic EPD (Third-Party Certified)	1 product
Proprietary EPD (Third-Party Certified)	1.5 products

Materials that meet multiple criteria are eligible only for the highest valuation available; the valuations cannot be combined. Also, materials must be sourced from at least five different manufacturers.

Products covered by the North American-made Ceramic Tile, Mortar, and Grout EPDs can each contribute at least ½ product toward the 20-product requirement. For example, for a project with 8 different tiles installed with the same mortar but different grouts (all covered by EPDs), the 17 products (8 tiles, 8 grouts, 1 mortar) would contribute 8.5 "products" toward the 20-product requirement (Example A). In the same scenario, if the mortar, grout, and 1 of the 8 tiles also have a proprietary EPD, the same 17 tiles and related materials would contribute 13.5 "products" (Example B).

Example A
(8 tiles + 1 mortar + 8 grouts) × .5 products = 8.5

Example B
(1 tile × 1 product) + (1 mortar × 1 product)
+ (8 grouts × 1 product) + (7 tiles × .5 products) = 13.5

Option 2 (1 Point)
Multi-Attribute Optimization

One point can be earned by using products with improved, or plans for improved environmental life-cycle impacts when at least 10 of those products are used or those products comprise at least 10% of the total value of permanently installed products in the project. Valuations for such materials are awarded on a per-material basis, and this LEED point is earned by using enough materials that their combined valuations total at least 10 "products" or 10% of the total value of the project.

Optimization Criteria	Valuation
Life-Cycle Impact Reduction Plan	½ product or 50% cost
Reduced Global Warming Potential (GWP)	1 product or 100% cost
10% Reduced GWP	1.5 products or 150% cost
20% Reduced GWP & 5% Reduction in Two Other Impact Categories	2 products or 200% cost

For this LEED point, generic EPDs provide a convenient baseline for comparison, and manufacturers of tiles, mortars, or grouts included in generic EPDs that also have one or more proprietary EPDs have the option to show below-industry-average impacts or an impact reduction plan, either of which can contribute to meeting the 10-product or 10% value threshold.

Example calculation 1: For a project with $1,000,000 in permanently installed products, including $20,000 of mortar and grout with GWP 10% lower than industry average, and $80,000 of ceramic tiles for which the manufacturer has included a publicly available action plan to reduce life-cycle environmental impacts:

$$\frac{\text{[\$20K (mortar and grout value) x 150\%]} + \text{[\$80K (tile value) x 50\%]}}{\text{\$1M (all materials value)}} = 7\%$$

In the previous example using the cost calculation method, the contribution of the tile and related installation materials toward the 10% minimum would be 7% (70% of the requirement).

Example calculation 2: For a project with 2 different tiles with GWP lower than industry average, 1 tile with a life-cycle impact reduction plan, 3 different grouts with life-cycle environmental impact reduction plans, and 1 mortar with GWP 10% lower than industry average:

(2 tiles x 1 product) + (1 tile x .5 product) +
(3 grout x .5 product) + (1 mortar x 1.5 products) = 5.5

In the above example using the product calculation method, the 7 tiles and related installation materials would contribute 5.5 "products" toward the 10-product minimum (55% of the requirement).

Green Globes ANSI/GBI 01-2024

Under the provisions of Section 5.2, *Product Life Cycle*, using North American-made ceramic tiles, mortars, and/or grouts can contribute toward the 39 available points for using products with EPDs.

29 points are awarded for using products with **cradle-to-gate** life-cycle evaluations based on:				
EPDs: Generic or Proprietary	AND / OR	Third-Party Verified Proprietary Life-Cycle Assessment	AND / OR	Third-Party Certification to Multiple Attribute Standards
10 points are awarded for using products with **cradle-to-grave** life-cycle evaluations based on:				
EPDs: Generic or Proprietary	AND / OR	Third-Party Verified Proprietary Life-Cycle Assessment		

Products recognized as having cradle-to-grave life cycle evaluations are additionally recognized for cradle-to-gate.

Points are awarded based on the number of products used. Products with EPDs are valued the same, regardless of whether their EPDs are generic or proprietary; both contribute equally toward the product total.

	# Products	Points
Cradle-to-Gate Life-Cycle Evaluations	≥40	29
	≥38 to ≤39	26
	≥35 to ≤37	23
	≥33 to ≤34	20
	≥30 to ≤32	17
	≥28 to ≤29	14
	≥25 to ≤27	11
	≥23 to ≤24	8
	≥21 to ≤22	7
	≥18 to ≤20	6
	≥15 to ≤17	5
	≤15	0
Cradle-to-Grave Life-Cycle Evaluations	10	10
	9	9
	8	8
	7	7
	6	6
	5	5

Without limit, using North American-made ceramic tiles, mortars, and grouts covered by EPDs will contribute to this requirement on a cradle-to-gate and cradle-to-grave basis. Products that are also Green Squared Certified® will earn double points under the cradle-to-gate provisions for also meeting the requirement for products with third-party certifications based on multiple attribute standards.

Sample calculation for a project with 10 tile products, 2 mortars, and 10 grouts covered by the EPD:

7 Points (22 products with cradle-to-gate, covered by EPD)
+ 10 Points (22 products with cradle-to-grave, also covered by EPD)
= 17 Total Points

Sample calculation for the same project, but with 3 of the tile products, 1 mortar and 2 grouts additionally having Green Squared® Certification:

13 Points (28 products; 22 with cradle-to-gate, covered by EPD, 6 of which are additionally recognized as Green Squared Certified®)
+ 10 Points (22 products with cradle-to-grave, also covered by EPD)
= 23 Total Points

CREDITS AND COMPLIANCE
NORTH AMERICAN-MADE CERAMIC TILE, MORTAR, AND GROUT

NAHB National Green Building Standard

NAHB National Green Building Standard is commonly referred to as ICC 700. North American-made ceramic tile can help achieve points under Section 611.1, Product Declarations, in this ANSI-approved standard and rating system for residential construction. In this section of the standard, 5 points are awarded if EPDs are submitted for 10 different products installed in the building project. Each building material with an industry-wide EPD contributes a full 'product' toward the 10-product goal. Each building material with a product-specific EPD contributes two 'products' toward the 10-product goal.

Additionally, up to 10 points can be awarded under Section 610, Life Cycle Analysis, for using products with lower environmental impacts, compared to products intended for the same use. To garner points under Section 610, the selected product must improve upon multiple environmental impacts by an average of 15%, with the number of points awarded tied to the number of impact categories in which the selected product performs better.

Number of Impact Categories	Points
4	2
5	3

Applicable Impact Categories:
- Primary energy use
- Global warming potential
- Acidification potential
- Eutrophication potential
- Ozone depletion potential
- Smog potential

The standard requires that the LCA tool used to determine the environmental impacts must be based on a minimum reference service life for a building of 60 years. It allows comparisons to be made between different types of products with the same use. It also allows comparison of individual product impacts to the industry averages for the same product type.

Each tiling product covered by the North American-made tile, mortar and/or grout EPDs contributes a full product toward the 10-product threshold specified by Section 611.1 of this standard. Those which have product-specific EPDs count double, expanding opportunities for garnering the previously discussed 5 points and creating the possibility of satisfying the 10-product requirement solely with tile installations alone!

Furthermore, the North American-made Ceramic Tile, Mortar, and Grout EPDs report environmental impacts over 75 years, as analyzed by GaBi LCA software, according to the requirements of the standard, fulfilling the 60-year minimum building service life with no requirement to account for product replacements.

When choosing between tile and an alternate flooring material, using ceramic tile covered by the EPD is advantageous when building to this standard, because the EPD shows very low environmental impacts in all categories. In fact, tile covered by the EPD has the lowest impact in all six impact categories, as compared to the impacts reported for other common flooring options in their publicly available, generic EPDs. Refer to the 75-year impact analysis graphs included in this guide for details.

When choosing between specific tiles, mortars, and/or grouts, products covered by generic EPDs will additionally contribute when such products also have proprietary EPDs showing impacts that are on average 15% lower, as compared to the industry average reported in the generic EPD, in at least 4 categories.

Additionally, products that are Green Squared Certified® can also contribute points as detailed elsewhere in the NAHB Green Building Standard. Refer to the Tile and Green Building chart in ***Tile: The Natural Choice*** for details.

International Green Construction Code (IgCC) Powered by ASHRAE Standard 189.1

About IgCC: An initiative of the International Code Council (ICC). IgCC was developed as model code language for states and municipalities to establish baseline sustainability requirements for new and existing commercial buildings.

About ASHRAE 189.1: An ANSI-approved standard, ASHRAE 189.1 was designed to be incorporated into governing jurisdictions' codes and ordinances for commercial buildings and enforced by building officials and inspectors.

IgCC and ASHRAE Standard 189.1 are now integrated into a single model code and standard for high-performance buildings.

In IgCC Section 901.5.1.4 (ASHRAE 189.1 Section 9.5.1.4), *Third-Party Multi-Attribute Certification*, at least five different products installed in the building project at the time of issuance of certificate of occupancy shall be in accordance with one or more standards listed under section 901.5.1.4.

EPD Each tiling product used, if covered by one or more of the North American made Ceramic Tile, Mortar, and/or Grout EPDs, counts as one product toward the ten-product threshold.

CALGreen

This standard is part of the California Building Standards Code and is commonly adopted as model language by developers of green building standards and rating systems in other parts of the country.

Section A5.409.3 for Non-Residential Construction requires at least 50% use of materials or assemblies based on life-cycle assessment (LCA) of their global warming potential (climate change/greenhouse gases) and two more environmental impacts from the list below:

- Fossil fuel depletion
- Stratospheric ozone depletion
- Acidification of land and water resources
- Eutrophication
- Photochemical oxidants (smog)

EPD Tiling products covered by the North American-made Ceramic Tile, Mortar and/or Grout EPDs are eligible for consideration under this section of CALGreen, as the EPDs provides LCA data and address the referenced environmental impacts.

GSA P-100 Facilities Standards

This standard incorporates sustainability criteria into design standards for the construction of government-funded buildings. Section 3.7 (Interior Finishes Performance) sets forth several provisions for ceramic tile:

The "Baseline" provision specifies that tiles conform to ANSI A137.1, the ANSI standard for ceramic tile.

*Note: At the time of this publication, there are no GSA P-100 provisions for tile mortar or tile grout.

ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Today, North American construction products are increasingly being evaluated based on their 75-year environmental footprint, a time frame chosen for the average service life of a building. Accordingly, the EPDs for North American-made Ceramic Tile, Mortar, and Grout provide long-term environmental impact data. In fact, the North American flooring Product Category Rule (PCR), UL 10010-7, requires EPDs to provide a life-cycle assessment (LCA) with a 75-year impact analysis. This appropriately includes the environmental impacts associated with acquiring a product's raw materials, manufacturing the product, and then delivering, installing, maintaining, and disposing of it, multiplied by the theoretical number of times the product would wear out and would have to be reinstalled (i.e., 75 years divided by the product's service life, in years).

In all six standard LCA environmental impact assessment categories, as included in the EPD for North American-made Ceramic Tile, Mortar, and Grout, the environmental benefits resulting from tile's inherent durability, long life, and low maintenance are clearly realized.

The EPDs for North American-made tiles, mortars, and grouts all report very low 75-year environmental impacts per installed square meter. In fact, when the EPD for North American-made Tile is compared to the generic EPDs for other types of flooring, developed under the same PCR and using the same building service life, North American-made ceramic tile has the lowest overall environmental impact. This includes the lowest Global Warming Potential and the lowest Fossil Fuel Resource Depletion.

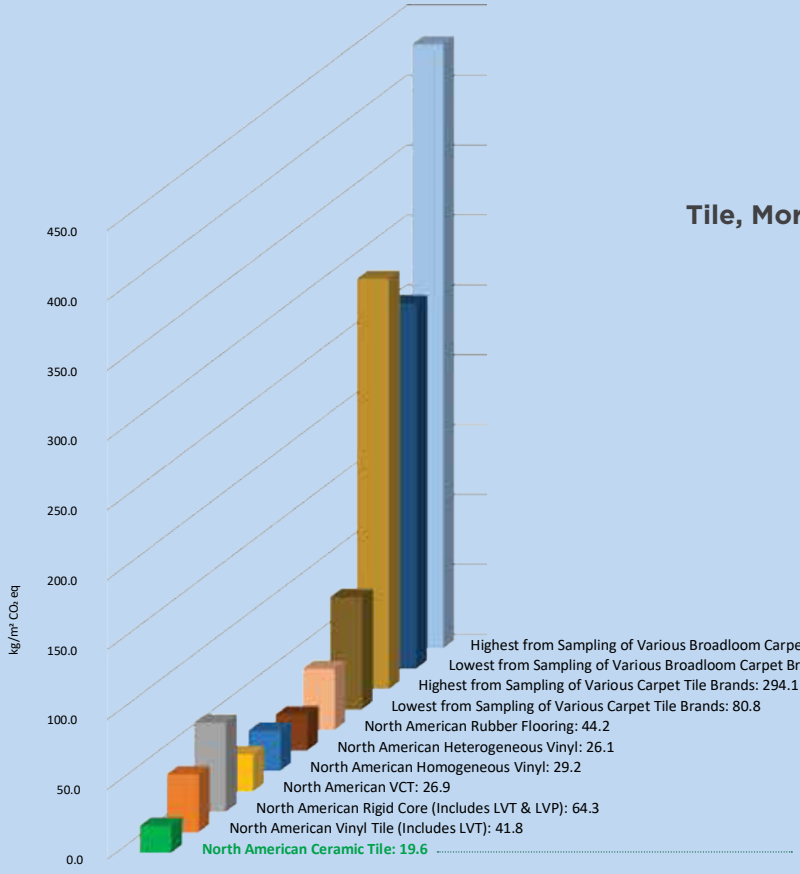
ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Global Warming Potential (GWP)

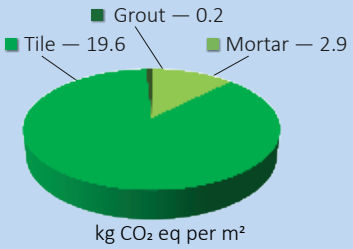
GWP, commonly referred to as "carbon footprint," is measured by emissions of carbon-equivalent gases and relates to climate change.

The 75-year GWP for North American-made Ceramic Tile, Mortar and Grout, based on their EPDs, is 19.6 kg CO_2 equivalent (eq.) per square meter for tile, 2.9 kg per m^2 for mortar, and 0.2 kg per m^2 for grout.

GWP: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined GWP



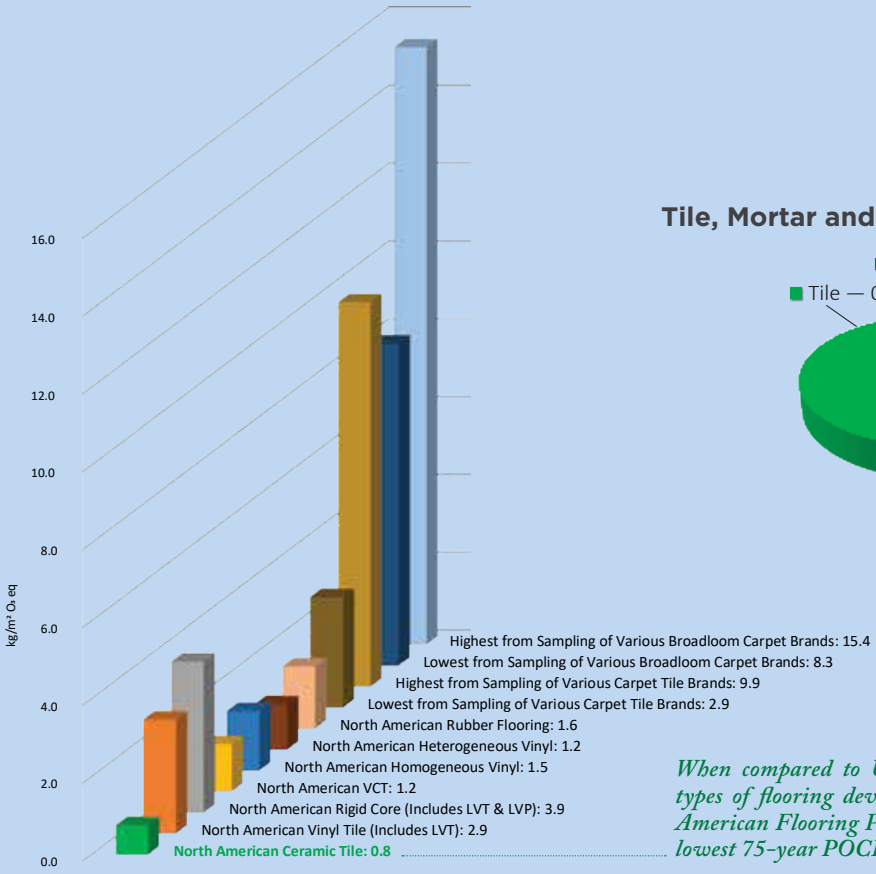
When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year GWP value.

Photochemical Oxidant Creation Potential (POCP)

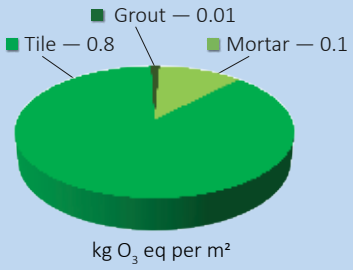
POCP is directly linked to smog formation. Smog is harmful to humans and animals, most notably for aggravating bronchial-related diseases; it also inhibits plant growth due to decreased UV radiation, and can discolor ground-level materials like building exteriors.

The 75-year POCP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.8 kg O_3 equivalent (eq.) per square meter for tile, 0.1 kg per m^2 for mortar, and 0.01 kg per m^2 for grout.

POCP: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined POCP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year POCP value.

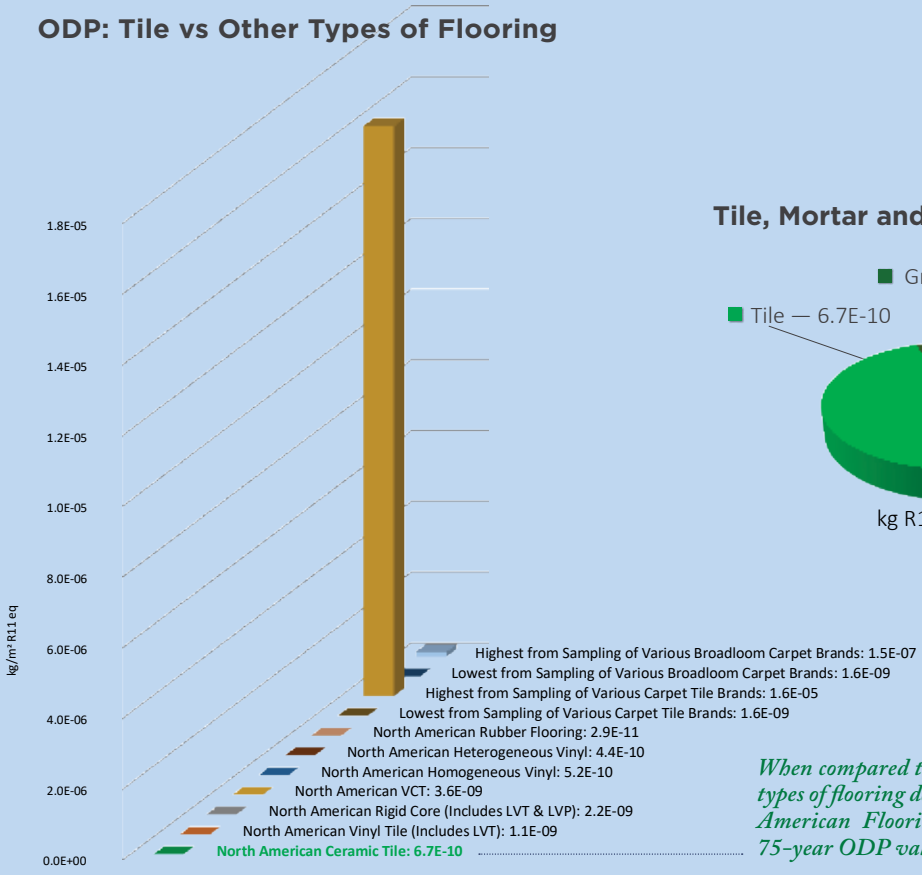
ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Ozone Depletion Potential (ODP)

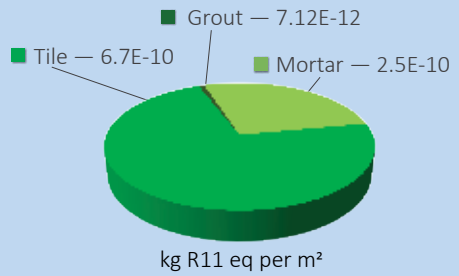
Ozone depletion occurs when chlorofluorocarbons (CFCs) and hydrofluorocarbons (HCFCs) reach the stratosphere, react with the sun, and break down the ozone layer. Decreased ozone can lead to an increase in the amount of UV-B radiation that reaches Earth's surface, having harmful effects on human health, animal health, terrestrial and aquatic ecosystems, biochemical cycles, and materials.

The 75-year ODP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.00000000067 kg R11 equivalent (eq.) per square meter for tile, 0.00000000025 kg per m^2 for mortar, and 0.00000000000712 kg per m^2 for grout.

ODP: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined ODP



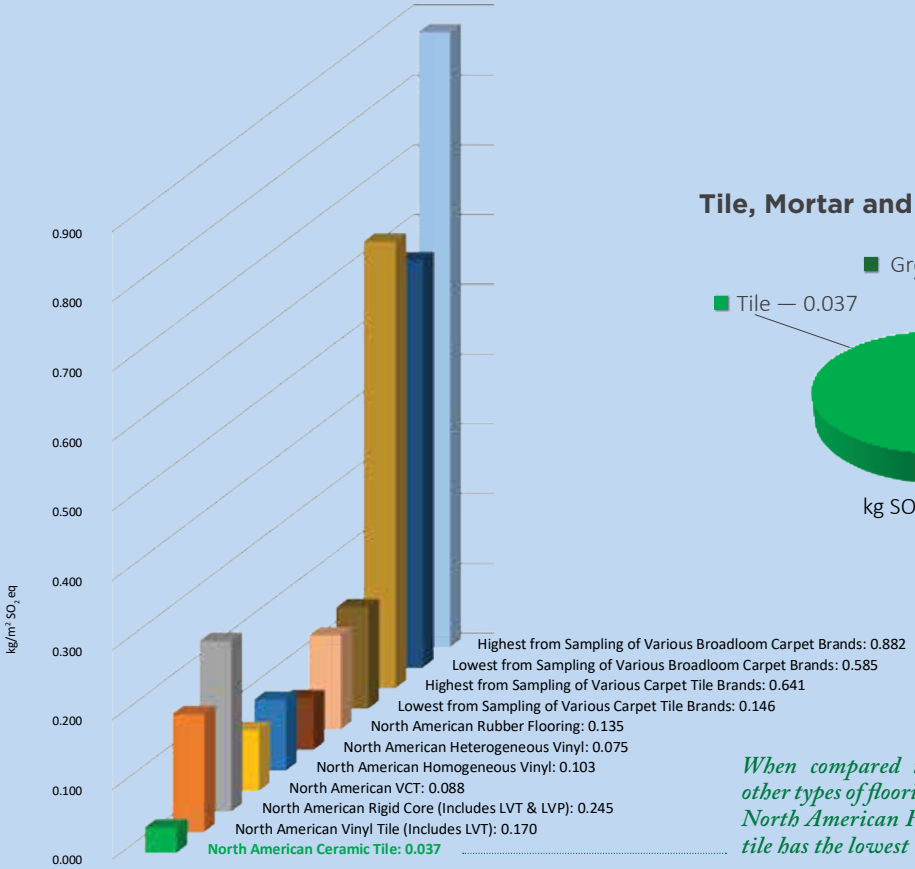
When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile's 75-year ODP value is among the lowest.

Acidification Potential (AP)

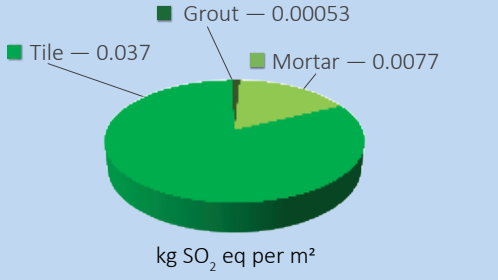
Acidification occurs when soil, groundwater, surface water and atmospheric moisture pH levels are lowered. This can have a harmful impact on organisms, ecosystems, and man-made materials, including buildings.

The 75-year AP for North American-made Ceramic Tile, Mortar and Grout, based on their EPDs, is 0.037kg SO_2 equivalent (eq.) per square meter for tile, 0.0077 kg per m^2 for mortar, and 0.00053 kg per m^2 for grout.

AP: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined AP

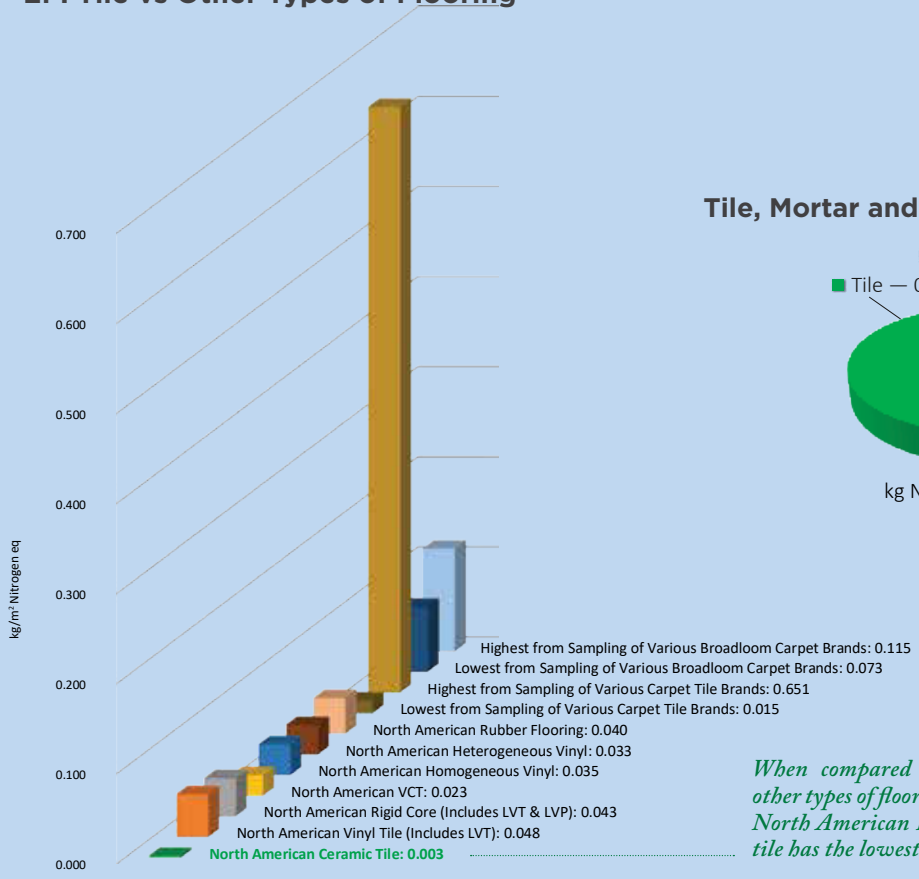


When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year AP value.

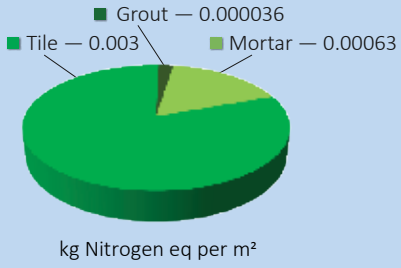
ENVIRONMENTAL FOOTPRINT: TILE, MORTAR AND GROUT
A 75-YEAR IMPACT ANALYSIS

Eutrophication Potential (EP)

EP: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined EP



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, UL 10010-7, tile has the lowest 75-year EP value.

Eutrophication is the enrichment of a body of water (or ecosystem) with nutrients needed for photosynthesis, such as carbon dioxide and nutrient compounds containing nitrogen and/or phosphorus, commonly from fertilizer runoff and sewage. It is a significant cause of oxygen depletion in bodies of water, resulting from excess plant and algal growth, causing hypoxic conditions in which marine life cannot be sustained.

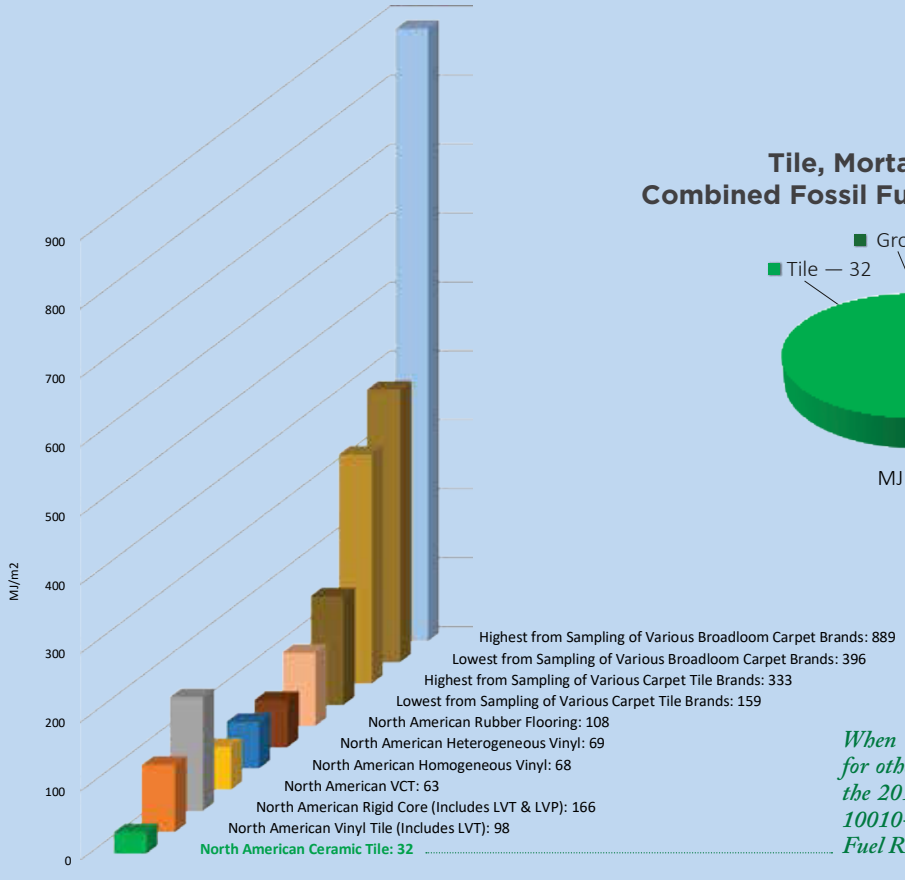
The 75-year EP for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 0.003 kg Nitrogen equivalent (eq.) per square meter for tile, 0.00063 kg per m^2 for mortar, and 0.000036 kg per m^2 for grout.

Fossil Fuel Resource Depletion

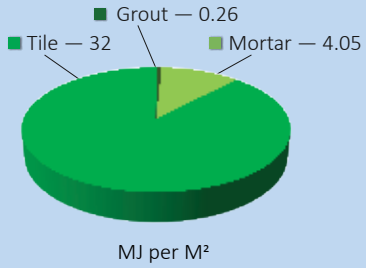
The utilization of fossil fuel resources throughout the life cycle of a product includes primary non-renewable energy resources such as petroleum, coal, and natural gas used as raw materials and as fuel in the manufacture, installation, maintenance, and disposal of the product. Efforts among environmental life cycle experts have been made to consider depletion of other types of resources, including land and water, but such evaluations are not often included in product LCAs due to difficulties in quantification at the site level.

The Fossil Fuel Resource Depletion over 75 years for North American-made Ceramic Tile, Mortar, and Grout, based on their EPDs, is 32 MJ per square meter for tile, 4.05 MJ per m^2 for mortar and 0.26 MJ per m^2 for grout.

Fossil Fuel Resource Depletion: Tile vs Other Types of Flooring



Tile, Mortar and Grout: Combined Fossil Fuel Resource Depletion



When compared to UL Certified EPDs for other types of flooring developed under the 2018 North American Flooring PCR, 10010-7, tile has the lowest 75-year Fossil Fuel Resource Depletion.

EPD
TRANSPARENCY SUMMARY: TILE

COMPANY NAME	Industry-Wide
PRODUCT NAME	North America Ceramic Tile: Porcelain, Pressed Floor, Mosaic,Quarry, Glazed Wall
PRODUCT DESCRIPTION	Floor or wall covering which is inert, fire resistant, non-combustible, durable, easy to maintain and made of mineral-based natural materials. Manufacturers include American Wonder Porcelain, Arto, Crossville, Dal-Tile, Del Conca USA, Florida Tile, Interceramic, Ironrock, Porcelanite-Lamosa, Portobello America, Quarry Tile Company, StonePeak Ceramics, and Vitromex
PRODUCT CATEGORY RULE (PCR)+ VERSION	UL PCR Part B: Flooring, 10010-7, Version 2.0, September 2018
CERTIFICATION PERIOD	April 1, 2020 to May 30, 2026
DECLARATION NUMBER	4789101745.101.1
EPD TYPE	☐ PRODUCT SPECIFIC ☑ INDUSTRY AVERAGE
DECLARED/ FUNCTIONAL UNIT	Functional Unit: 1 meter squared

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ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

*Note:
The industry-wide EPD for ceramic tile and the North American flooring PCR are being updated. The current ceramic tile EPD is valid through May 30, 2026. Access the online version of TNC for updates.

GREEN BUILDING QUALIFICATIONS

LEED v4 Building Product Disclosure and Optimization - EPDs, Option 1
ASHRAE 189.1 Material Compliance
IgCC Material Compliance
Green Globes 3.5.1.2.1
NAHB Material Selection

REFERENCE SERVICE LIFE (IF APPLICABLE)	75 Years
LCA SOFTWARE + VERSION	GaBi Database Version 9.2.0.58
IMPACT ASSESSMENT METHOD + VERSION	TRACI 2.1 & CML 2001-2016

LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed through the product's lifecycle over 75 years (cradle to grave impacts)—including production, construction, use (including use, maintenance, refurbishment and replacement), and end of life.

	ATMOSPHERE			WATER		EARTH	
	Global Warming Potential refers to long-term changes in global weather patterns that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – polluting groundwater and harming aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI	19.6 kg CO_2-Equiv.	6.7E-10 kg CFC 11-Equiv.	0.757 kg O_3-Equiv.	0.0371 kg SO_2-Equiv.	0.00268 kg N-Equiv.	N/A kg Sb-Equiv.	N/A MJ
CML	19.7 kg CO_2-Equiv.	5.72E-10 kg R11-Equiv.	0.00176 kg Ethene-Equiv.	0.0323 kg SO_2-Equiv.	0.00536 kg PO_4-Equiv.	1.34E-05 kg Sb-Equiv.	242 MJ

Environment

MATERIAL CONTENT

Material content measured to 1%.

COMPONENT	MATERIAL	AVAILABILITY	MASS%	ORIGIN
Body	Clay	Mineral perpetual	69.78	US, Mexico, Europe
	Sand	Mineral perpetual	6.22	US, Mexico, Europe
	Talc	Mineral perpetual	1.12	US, Mexico, Europe
	Feldspar	Mineral perpetual	11.26	US, Mexico, Europe
	Internal Scrap	Pre-consumer	6.48	US, Mexico, Europe
	Frit	Mineral perpetual	0.41	US, Mexico, Europe
	Calcium Carbonate	Mineral perpetual	1.46	US, Mexico, Europe
	Ash	Mineral perpetual	1.35	US, Mexico, Europe
	Additives	Mineral perpetual	0.66	US, Mexico, Europe
Surface	Ink	Mineral perpetual	0.15	US, Mexico, Europe
	Glaze	Mineral perpetual	1.06	US, Mexico, Europe

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	VARIES %
POST-CONSUMER RECYCLED CONTENT	VARIES %
VOC EMISSIONS	ZERO/INORGANIC
WATER CONSUMPTION	0.0242 CUBIC METERS

RECYCLING OR REUSE

Ceramic tile can outlast multiple generations of building occupants and is commonly reused in an existing building or salvaged for use in a new building. Solid and inert, it can also be used in a variety of post-life applications such as clean fill, roadway paving, and raw materials used to manufacture new products. To represent a "worst case" scenario, this EPD reports environmental impacts based on 100% of all tile removal waste being disposed of in a landfill.

ENERGY

RENEWABLE ENERGY	5.12 %	13.7	**MJ**
NON-RENEWABLE ENERGY	94.88 %	254	**MJ**

STANDARDS

ANSI A137.1 American National Standard Specifications for Ceramic Tile

ISO 13006 International Organization for Standardization Specifications for Ceramic Tile

ANSI A138.1/Green Squared® American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

NAME	Tile Council of North America (TCNA)
PHONE	864-646-8453
EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

EPD
TRANSPARENCY SUMMARY: GROUT

COMPANY NAME	**Industry-Wide**
PRODUCT TYPE	**ANSI A118.6, A118.7, and ISO 13007**
PRODUCT NAME	Cement Grout for Tile Installation: Made in North America
PRODUCT DEFINITION	Factory-prepared mixture of cement, aggregate and other ingredients used to fill joints, or the spaces between tiles. Once cured, it is durable, fire-resistant, and moisture insensitive. Manufacturers include Ardex, Bostik, Crest, Custom, HB Fuller/TEC, Interceramic, Laticrete, MAPEI, Parex and Cemix/Texrite
PRODUCT CATEGORY RULE (PCR)	UL PCR Part B: Cement-Based Grout, Adhesive Mortar, and Leveling Underlayment, v1.0, 2022
CERTIFICATION PERIOD	**January 1, 2023 to January 1, 2028**
DECLARATION NUMBER	**Pending**

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed throughout the product's lifecycle – including raw material extraction, transportation, manufacturing, packaging, use, and disposal at end of life.

	ATMOSPHERE			WATER		EARTH	
	Global Warming Potential refers to long-term changes in global weather patterns – including temperature and precipitation – that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce a type of air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – a phenomenon that pollutes groundwater and harms aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals and gases, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI	**0.192** kg CO2-Equiv.	**7.12E-12** kg CFC 11-Equiv.	**0.00906** kg O3-Equiv.	**0.000528** kg SO2-Equiv.	**3.59E-05** kg N-Equiv.	**N/A**	**.026** MJ

FUNCTIONAL UNIT: One square meter (1 sqm) of installed grout. Life cycle impact results are expressed for 75 years. Assumed application rate is 0.212 kilograms per square meter.

Environment

MATERIAL CONTENT

Material content measured to 1%.

MATERIAL	AVAILABILITY	MASS%	ORIGIN
Quartz	Mineral perpetual	34	Locally sourced US, Canada, Mexico
Portland cement	Mineral manufactured	33	US, Canada, Mexico, Europe
Calcium carbonate	Mineral perpetual	27	Locally sourced US, Canada, Mexico
Proprietary additives	Varies	2	US, Canada, Europe, Asia
Iron oxide	Mineral perpetual	1	Locally sourced US, Canada, Mexico
Calcium hydroxide	Mineral perpetual	1	Locally sourced US, Canada, Mexico
Gypsum	Mineral perpetual	1	Locally sourced US, Canada, Mexico
Vinyl acetate ethylene polymer	Polymer manufactured	<1	Locally sourced US, Canada, Mexico
Fly ash	Mineral manufactured	<1	Locally sourced US, Canada, Mexico
Silica	Mineral perpetual	<1	Locally sourced US, Canada, Mexico

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	**VARIES %**
POST-CONSUMER RECYCLED CONTENT	**VARIES %**
VOC EMISSIONS	**CDPH 01350 COMPLIANT**
WATER CONSUMPTION	**0.51 L**

RECYCLING OR REUSE

Tile installations with cement grout can last as long as buildings and are often reused for multiple generations of building occupants. Although tile and cement grout can be used in a variety of post-life applications (e.g., clean fill, roadway paving, aggregate for new products, etc.), this analysis adopts a conservative approach and assumes that 100% of tile and associated waste are disposed in a landfill.

ENERGY

RENEWABLE ENERGY	**9 %**	**0.26 MJ**
NON-RENEWABLE ENERGY	**91 %**	**2.59 MJ**

STANDARDS

ANSI A118.6 American National Standard Specifications, Standard Cement Grouts for Tile Installation
ANSI A118.7 American National Standard Specifications, High Performance Cement Grouts for Tile Installation
ISO 13007 Terms, Definitions and Specifications, Ceramic Tile Grouts and Adhesives
ANSI A138.1/Green Squared® American National Standard Specifications, Sustainable Ceramic Tiles, Glass Tiles and Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

NAME	Tile Council of North America (TCNA)
PHONE	864-646-8453
EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

EPD
TRANSPARENCY SUMMARY: MORTAR

COMPANY NAME	**Industry-Wide**
PRODUCT TYPE	**ANSI A118.1, A118.4/11, A118.15, and ISO 13007**
PRODUCT NAME	Cement Mortar for Tile Installation: Made in North America
PRODUCT DEFINITION	Blend of cement, sand, water retention compounds and other additives used to adhere tile to a substrate. Once cured, it is durable, fire-resistant, moisture insensitive, and maintenance-free. Manufacturers include Ardex, Bostik, Cemenquin/Cement Pro, Crest, Custom, HB Fuller/TEC, Interceramic, Laticrete, MAPEI, Parex, Schluter and Cemix/Texrite
PRODUCT CATEGORY RULE (PCR)	UL PCR Part B: Cement-Based Grout, Adhesive Mortar, and Leveling Underlayment, v1.0, 2022
CERTIFICATION PERIOD	**January 1, 2023 to January 1, 2028**
DECLARATION NUMBER	**Pending**

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed throughout the product's lifecycle – including raw material extraction, transportation, manufacturing, packaging, use, and disposal at end of life.

ATMOSPHERE			WATER		EARTH	
Global Warming Potential refers to long-term changes in global weather patterns – including temperature and precipitation – that are caused by increased concentrations of greenhouse gases in the atmosphere.	**Ozone Depletion Potential** is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	**Photochemical Ozone Creation Potential** happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce a type of air pollution known as smog.	**Acidification Potential** is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – a phenomenon that pollutes groundwater and harms aquatic life.	**Eutrophication Potential** occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	**Depletion of Abiotic Resources (Elements)** refers to the reduction of available non-renewable resources, such as metals and gases, that are found on the periodic table of elements, due to human activity.	**Depletion of Abiotic Resources (Fossil Fuels)** refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
TRACI **2.9** kg CO2-Equiv.	**2.53E-10** kg CFC 11-Equiv.	**0.144** kg O3-Equiv.	**0.0077** kg SO2-Equiv.	**6.29E-04** kg N-Equiv.	**N/A**	**4.05** MJ

FUNCTIONAL UNIT One square meter (1 sqm) of installed mortar. Life cycle impact results are expressed for 75 years. Assumed application rate is 4.07 kilograms per square meter.

Environment

MATERIAL CONTENT

Material content measured to 1%.

MATERIAL	AVAILABILITY	MASS%	ORIGIN
Calcium carbonate	Mineral perpetual	36	Locally sourced US, Canada, Mexico
Portland cement	Mineral manufactured	28	Locally sourced US, Canada, Mexico
Quartz	Mineral perpetual	20	Locally sourced US, Canada, Mexico
Silica	Mineral perpetual	11	US, Canada, Mexico
Fly ash	Mineral manufactured	2	US, Canada, Mexico
Proprietary additives	Varies	1	US, Mexico, Europe
Vinyl acetate ethylene polymer	Polymer manufactured	1	US, Mexico, Europe
Gypsum	Mineral perpetual	<1	US, Canada, Mexico
Calcium hydroxide	Mineral perpetual	<1	US, Canada, Mexico
Iron oxide	Mineral perpetual	<1	US, Canada, Mexico

ADDITIONAL ENVIRONMENTAL INFORMATION

PRE-CONSUMER RECYCLED CONTENT	**VARIES %**
POST-CONSUMER RECYCLED CONTENT	**VARIES %**
VOC EMISSIONS	**CDPH 01350 COMPLIANT**
WATER CONSUMPTION	**6.5 L**

RECYCLING OR REUSE

Tile installations with cement mortar can last as long as buildings and are often reused for multiple generations of building occupants. Although tile and cement mortar can be used in a variety of post-life applications (e.g., clean fill, roadway paving, aggregate for new products, etc.), this analysis adopts a conservative approach and assumes that 100% of tile and associated waste are disposed in a landfill.

ENERGY

RENEWABLE ENERGY	**10 %**	**4.51 MJ**
NON-RENEWABLE ENERGY	**90 %**	**39.3 MJ**

STANDARDS

ANSI A118.1 American National Standard Specifications, Dry-Set Cement Mortar
ANSI A118.4/11 American National Standard Specifications, Modified Dry-Set Cement Mortar
ANSI A118.15 American National Standard Specifications, Improved Modified Dry-Set Cement Mortar
ISO 13007 Terms, Definitions and Specifications, Ceramic Tile Grouts and Adhesives
ANSI A138.1/Green Squared® American National Standard Specifications, Sustainable Ceramic Tiles, Glass Tiles and Tiles, and Tile Installation Materials

CERTIFICATIONS

MANUFACTURER CONTACT INFO

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EMAIL	
WEBSITE	www.TCNAtile.com

www.UL.com/environment | environment@ul.com

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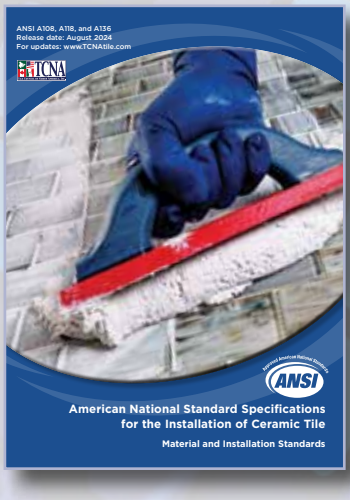
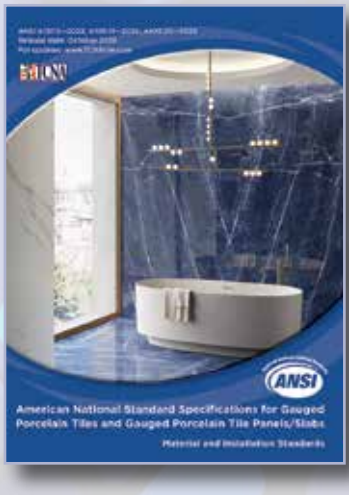
ANSI A137.2

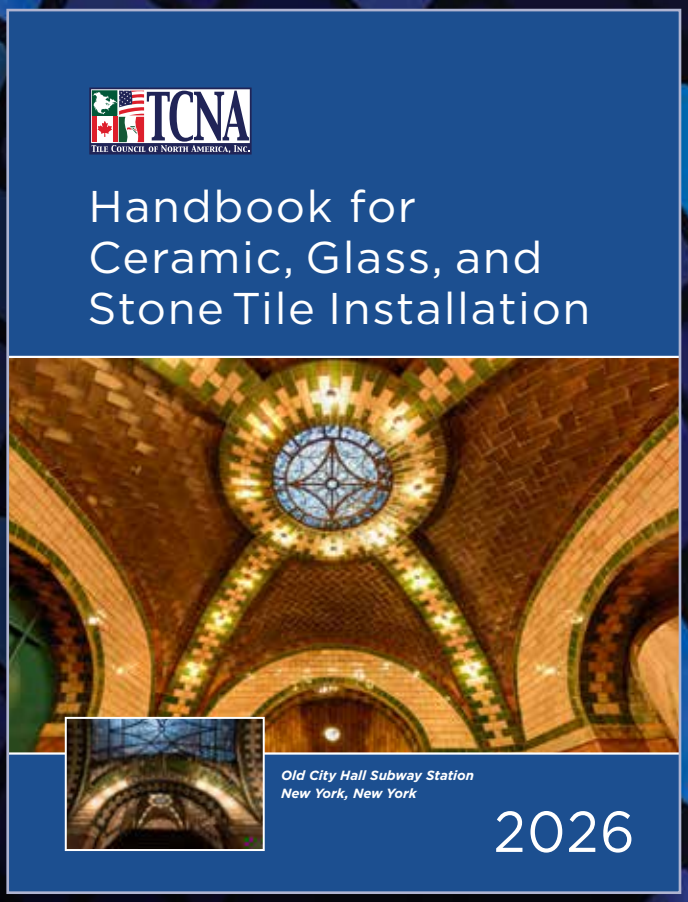
ANSI A137.1

ANSI A108, A118, and A136



ANSI A137.3, A108.19 and A108.20





Update your reference library today with the standards information you need for a successful project.

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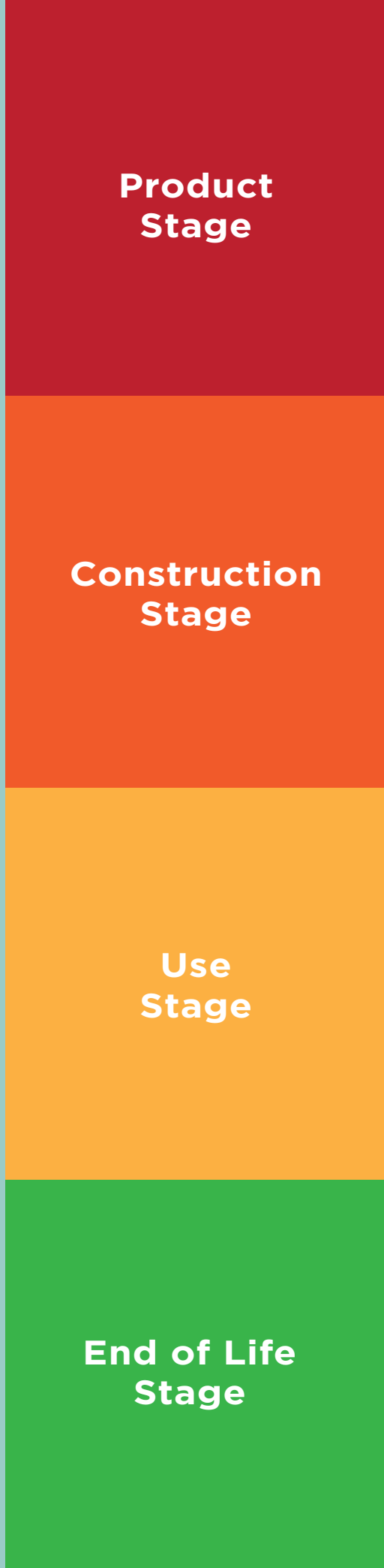
Guide to Embodied Carbon

2026



The term “embodied carbon” has gained global recognition due to the growing concern of the environmental impact of manufacturing and construction processes, as well as the impact from the use and demolition stages of materials and products.

In May of 2023, the U.S. General Services Administration (GSA) announced the procurement for lower embodied carbon construction materials in GSA projects funded by the Inflation Reduction Act. The Inflation Reduction Act provides $3.375 billion for the GSA’s investment in federal buildings. $2.15 billion is allocated to procure materials with a low embodied carbon for construction and renovation projects.

From a public perspective, education on embodied carbon is important due to its significant percentage of total global emissions and contribution to climate change. Providing increased awareness will give consumers information to assist them in making informed, sustainable choices in their consumption. The push for low-carbon products will encourage the public’s support of the development of eco-friendly industries, influence policy changes and business transparency, and contribute to a more environmentally responsible and sustainable society.

Quantifying Embodied Carbon

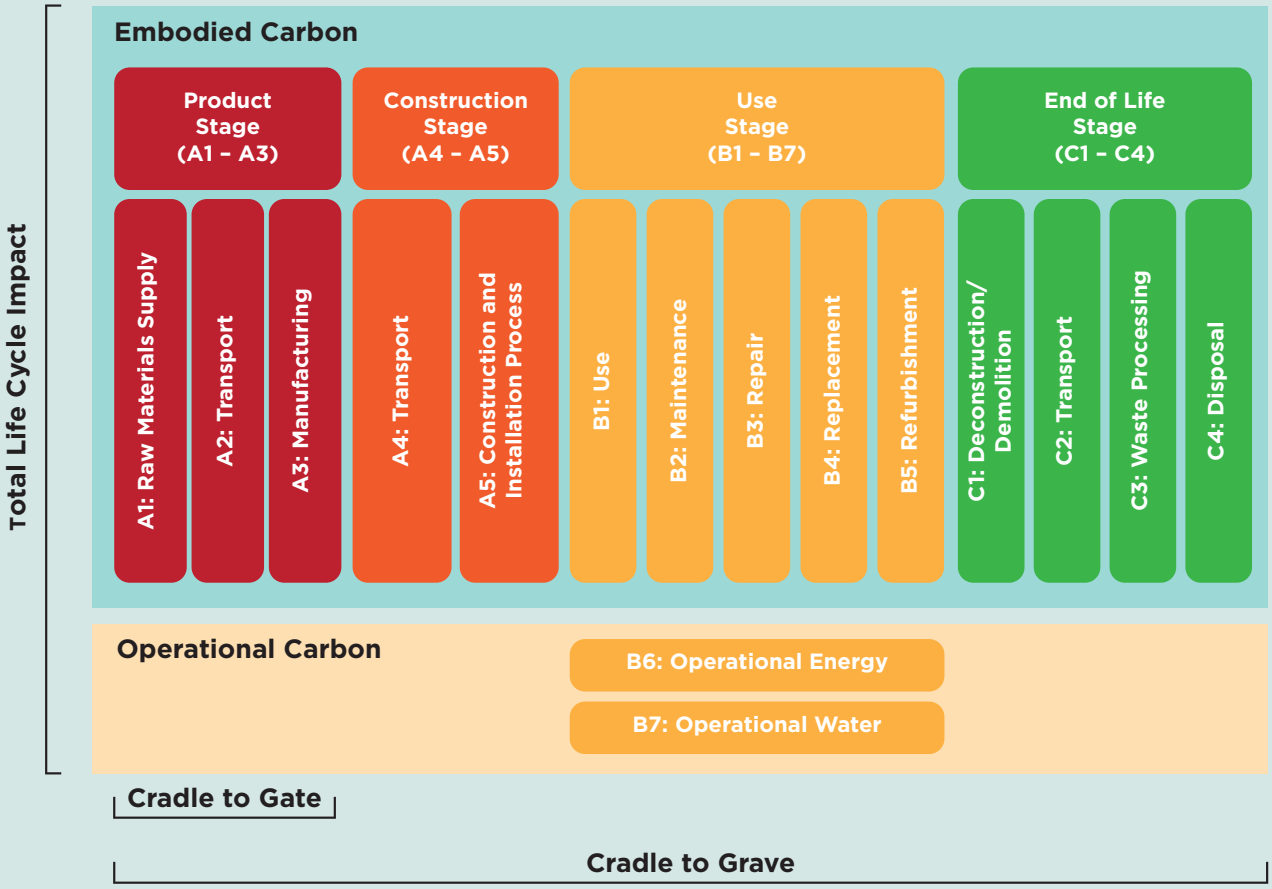
Embodied carbon represents greenhouse gas emissions, released throughout the total life cycle of a product. Embodied carbon is reported as global warming potential (GWP) and expressed in carbon dioxide equivalents. Quantifying a product’s embodied carbon requires a Life Cycle Assessment (LCA). The results of the LCA are then reported through an Environmental Product Declaration (EPD). The LCA is broken down into stages, and each stage is made up of lifecycle modules (see **Figure 1**.)

Currently, there is no clear definition on how embodied carbon should be reported. Some product EPDs report only on the production stage (Modules A1-A3) of the LCA, which provides a cradle-to-gate GWP. However, considering only modules A1-A3 does not reflect greenhouse gas emissions from maintenance, replacement, repair, refurbishment, or disposal during a building’s lifetime. When selecting a product based on embodied carbon, it is important to assess its cradle-to-grave GWP, which considers all life cycle stages (Modules A1-C4).

TCNA Recommendations on Embodied Carbon

Tile Council of North America (TCNA) has reflected this position by working with Building Transparency to update their Embodied Carbon in Construction Calculator (EC3) to incorporate LCA modules A4-C4 when comparing building materials within the "Plan and Compare Buildings" tool. TCNA has also responded to the Environmental Protection Agency’s Request for Information (RFI) concerning Inflation Reduction Act Programs to Reduce Embodied Greenhouse Gas Emissions Associated with Construction Materials and Products. TCNA recommended the environmental impacts from construction, use, and disposal stages (Modules A4-C4) should be taken into account to reflect a cradle-to-grave GWP. Additionally, TCNA responded to the Federal

Figure 1



Trade Commission's (FTC) request for public comment on potential updates to its Green Guides for Use of Environmental Marketing Claims. TCNA recommended the FTC amend the Green Guides to include rules for EPDs and statements about the amounts of embodied carbon contained in products to prevent deceptive and unfair trade practices.

As the world strives to reduce overall carbon emissions, understanding proper reporting tactics for building materials is crucial, where carbon emissions continue to occur during the construction and use phase of a product's life.

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FLOORING SUSTAINABILITY SUMMIT

Collaboration is Key at the 2025 Flooring Sustainability Summit

Sustainability in the building sector is constantly evolving, and the 2025 Flooring Sustainability Summit showcased just how far the industry has progressed. While the event brought together leaders from every flooring category, the conversations moved beyond individual materials to focus on the collective goals of reducing environmental impact, increasing transparency, and leveraging sustainability as a driver for smart business decisions. Co-hosted by the Carpet and Rug Institute (CRI), National Wood Flooring Association (NWFA), Natural Stone Institute (NSI), North American Laminate Flooring Association (NALFA), Resilient Floor Covering Institute (RFCI), and Tile Council of North America (TCNA), the industry is uniting around shared priorities. The Summit brought together expert-led panels, interactive workshops, and high-level briefings at the historic Mayflower Hotel and the U.S. Capitol Visitor Center. Conversations focused on circularity, data transparency, and supply chain collaboration, which are key initiatives shaping the future of the flooring industry.

Why the Summit Alliance Matters for the Flooring Industry

The Summit Alliance shows that when the flooring industry speaks with one voice, sustainability efforts move further and faster.

Opening Keynote Panel

The opening keynote speakers set the tone for diverse, lively, and productive collaboration.

Corey Clayborne
Senior VP of Knowledge and Practice, American Institute of Architects

Peter Templeton
President and CEO, U.S. Green Building Council

Alignment on the Common Materials Framework

One of the clearest signals of industry unity is the adoption of the **Common Materials Framework**. This shared structure for evaluating material sustainability means designers and specifiers can make informed decisions more easily by comparing products on consistent metrics. For manufacturers, including tile producers, this alignment simplifies communication of environmental attributes and helps products stand out in sustainability-driven projects. Manufacturers should better understand and utilize the Common Materials Framework because it directly impacts how customers evaluate and select their products in today's market.

Circularity As the Next Big Topic

Circularity is becoming a key sustainability driver, building upon existing embodied carbon reduction goals, operational efficiency, and design with reuse in mind. For the tile industry, this focus complements ongoing efforts to provide transparent reporting across the entire product life-cycle, from raw materials to end-of-life. With its

Chuck Chaitovitz of the U.S. Chamber of Commerce delivered a briefing on how the Chamber can support the flooring industry in advancing its sustainability initiatives, and how that can drive business growth—aligning environmental progress with business priorities.

long lifespan, durability, and low maintenance needs, tile is inherently well-suited to circularity importance. Discussion panels at the Summit reinforced that achieving true circularity requires collaboration across the entire supply chain.

Data Transparency That Works for the Market

The call for transparency is loud and clear, but so is the need for context. The industry is moving toward not only sharing sustainability data but also presenting it in a way that is relevant, understandable, and actionable. For tile, this means providing clear documentation on environmental and performance benefits that resonates with both sustainability experts and the architect and design community.

The first day format consisted of expert-led panel presentations followed by smaller group breakout workshops where the panel topics could be discussed in more depth. An important advantage for Summit participants was the ability to discuss issues and solutions with the panelists as well as share perspectives with diverse groups that represented different areas of the flooring supply chain.

Panelists included experts from the flooring industry, federal government, policy makers, the green building standards community, architecture and design leaders, and sustainability advocate groups, forming a wide range of perspectives:

Panel One – Sustainability Landscape 2025 and Beyond

- Andy Kireta, ASTM International
- Corey Enck, U.S. Green Building Council
- Jenna Hamilton, Green Building Institute
- Melanie De Cola, The American Institute of Architects
- William Paddock, WAP Sustainability (Moderator)

Panel Two – Flooring Circularity

- Alan Solomon, Sawkill Lumber
- Jim Whitfield, MAPEI
- Jonathan North, Mohawk Industries
- Mike Johnson, International Living Future Institute (Moderator)
- Nelson Russom, Turner Construction

Panel Three - Supply Chain Collaboration

- Bill Griese, Tile Council of North America (Moderator)
- Brenda Chashion, North American Floor Covering Distributors
- Elsa Mullin, Skanska
- Jack Cove, Pathways Ai
- Scott Humphrey, World Floor Covering Institute
- William Paddock, WAP Sustainability

Day Two — U.S. Capitol

Day two of the Summit included the first-ever Flooring Sustainability Summit Project Design Awards, an architectural panel, and high-level briefings at the U.S. Capitol visitor center.

Alessandro Filipponi
Standardization and Sustainability, Confindustria Ceramica

Elizabeth Von Lehe
Board Chair, American Society of Interior Designers

Eric Corey Freed
Principal and Director of Sustainability, CannonDesign

Architectural panelists included:

- Anica Landreneau, HOK
- Ashleigh Savage, SmithGroup
- Joshua Rubin, Perkins&Will
- Katie Mesia, Gensler
- Paul McKeever, TVS Architecture and Design
- Scott Conwell, International Masonry Institute

The Flooring Sustainability Summit will return to Washington, D.C., on July 15–16, 2026, offering another opportunity to discuss challenges within respective industries and advance shared sustainability objectives

Stay Informed!

Follow @FlooringSustainabilitySummit on LinkedIn for exclusive insights, updates, and registration information for the 2026 Summit. Visit www.flooringsummit.com to register or sign up for the Flooring Summit newsletter.

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