

Why Tile: Technical Resources



Product Performance: Specifying Tile For Green Construction



Standard and certification program
for tile product sustainability

- Multiple-attribute, balanced approach
- Includes setting materials

Recommended by U.S.
Environmental Protection
Agency (EPA) for
sustainable purchasing

→ [Green Squared Certified](#)



ANSI A138.1 Green Squared®
Standard: 5 standards in 1

- Tiles: Ceramic and Glass
- Powder Installation Products
- Paste/Liquid Installation Products
- Panel Installation Products
- Sheet Installation Products

→ [G2 standard A138.1](#)



www.GreenSquaredCertified.com

For Manufacturers:

- How to get certified

For Specifiers:

- How Green Squared products earn points and facilitate compliance
- Every green building standard/rating system reference to Green Squared

For Purchasers:

- Where to find Green Squared Certified® products
- Syndication with government purchasing databases and other purchaser databases

→ [Green Squared Certified](#)

Environmental Transparency: Low Life Cycle Environmental Impact

Environmental Product Declaration (EPDs)

How the ceramic tile industry transparently reports environmental LCA data.

Triple Transparency and Recognition in Green Building

Visit <https://whytile.com/library/tcna-tile-natural-choice/> for further information.

↓ Tile

Tile Transparency Chart: on page 55

Environmental Facts

Functional unit: 1 m² 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%)

↓ Mortar

Mortar Transparency Chart: on page 55

Environmental Facts

Functional Unit: 1 m² of Installed Tile Mortar
(Application Rate, 4.07 kg/m²)

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

↓ Grout

Grout Transparency Chart: on page 55

Environmental Facts

Functional Unit: 1 m² of Installed Grout
(Application Rate, 0.212 kg/m²)

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

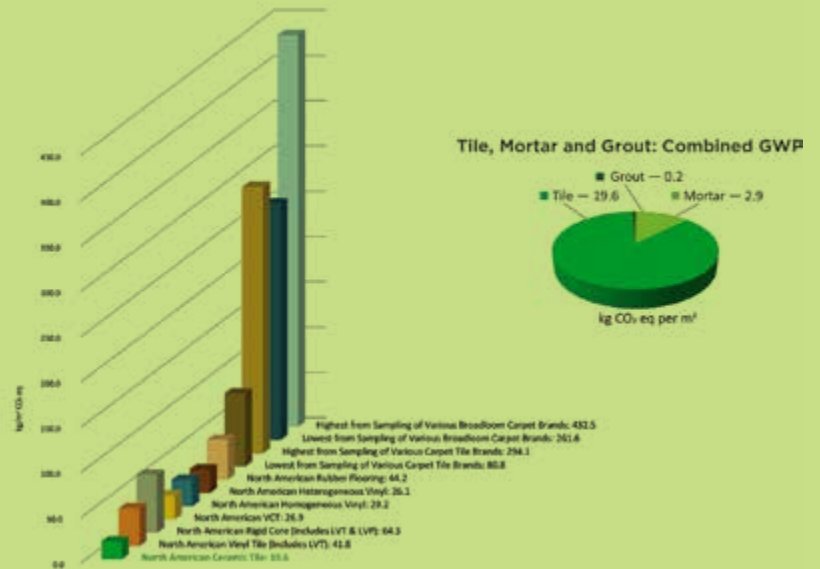
VOC Emissions-CDPH Section 01350	Meets
Recycled Content	Varies
Green Squared® Certification	Some Grout
ANSI A118.6, ANSI A118.7	Meets

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

Environmental Transparency: Low Life Cycle Environmental Impact

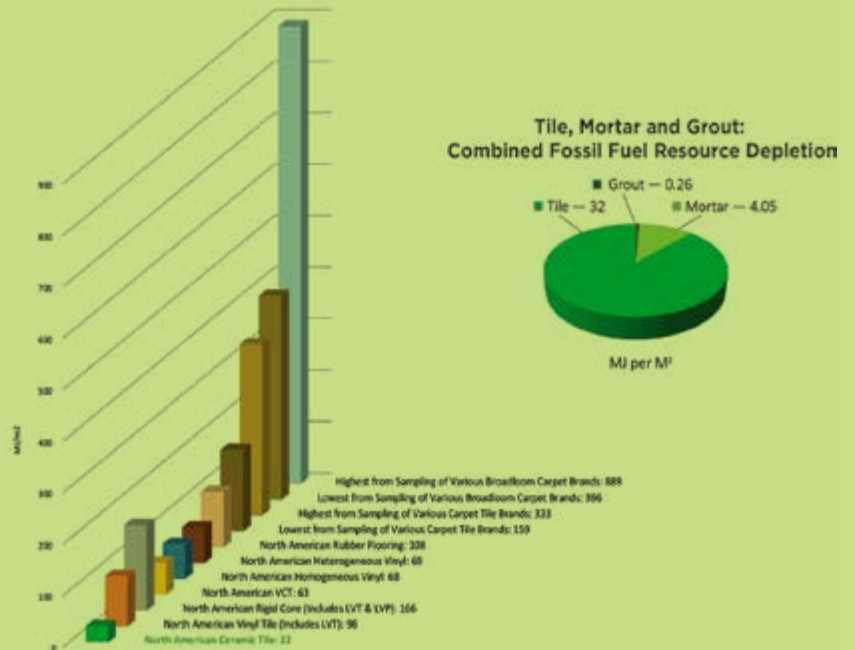
Global Warming Potential →

Global Warming Potential Graph:
page 63



Fossil Fuel Resource Depletion →

Fossil Fuel Resource Depletion Graph:
page 68



Embodied Carbon: One of the Hottest Topics in Green Building Today

What Is Embodied Carbon?

Greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.



How Is Embodied Carbon Measured?

Kilograms of CO₂ equivalent (CO₂e), which is the global warming potential (GWP) determined from a product life cycle assessment (LCA) in accordance with ISO 14044.

Importance of Cradle-To-Grave Embodied Carbon

Building owners, designers, and carbon accountants need to know the cradle-to-grave embodied carbon of the flooring products they select. A product may have low cradle-to-gate embodied carbon (i.e. emissions attributed to manufacturing), but if its service life is short and/or maintenance protocols are carbon-intensive, cradle-to-grave embodied carbon can be significantly higher, thus resulting in a significant increase to the carbon footprint of the building in which it is installed.

Embodied Carbon	GWP Information													
	Product			Construction		Use					End of Life			
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
	Raw Material Supply	Transport	Manufacturing	Transport	Construction - Installation Process	Use	Maintenance	Repair	Refurbishment	Replacement	De-construction Demolition	Transport	Waste Processing	Disposal
						B6: Operational Energy Use								
						B7: Operational Water Use								
	Cradle-to-Gate													
	Cradle-to-Grave													

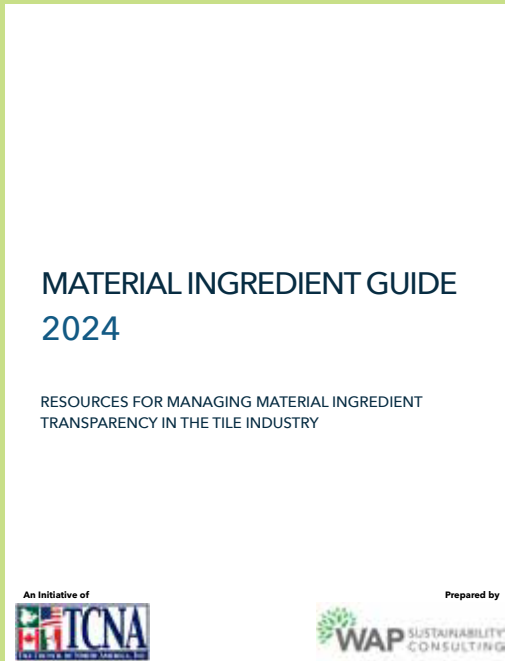
Relevance to Flooring Materials

LCA GWP data can be found in an environmental product declaration (EPD). In North America, EPDs for ceramic tile, wood flooring, resilient flooring, carpet, and laminate flooring are required to meet the North American flooring product category rule (PCR), UL 10010-7. This PCR requires a 75-year cradle-to-grave LCA, which takes into account environmental impacts from manufacturing, installation, maintenance, anticipated replacements, and disposal.

How Does Tile Measure Up?

When comparing TCNA's industry-wide EPD for ceramic tile to EPDs for other types of flooring meeting UL 10010-7, ceramic tile made in North America has the lowest 75-year GWP value. This means, ceramic tile's cradle-to-grave embodied carbon is lower than other flooring options.

Material Ingredient Transparency: Human Health/Wellness



- First of its kind in any industry
- GreenScreen® toxicological assessments for 34 common tile industry ingredients
- Framework for uniform reporting of tile, mortar, and grout ingredients using HPDs or Manufacturer Inventories
- Tools and guidance for contribution to LEED, WELL, and Living Building Challenge transparency and optimization credits

[→ Material Ingredients Guide](#)

Material Ingredient Transparency: Human Health/Wellness

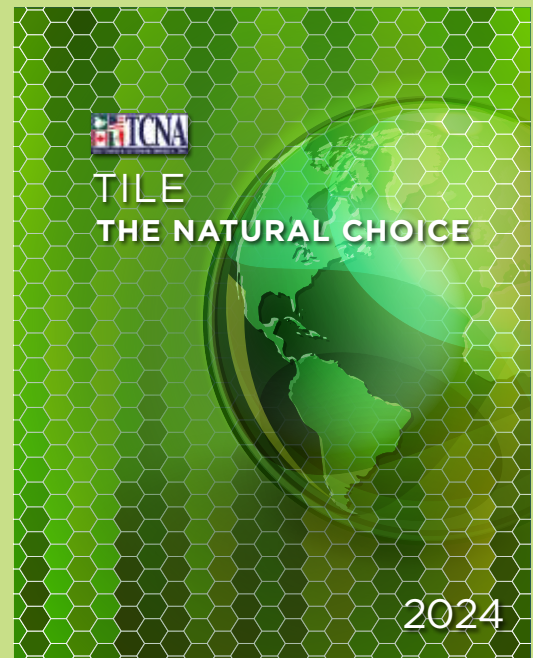
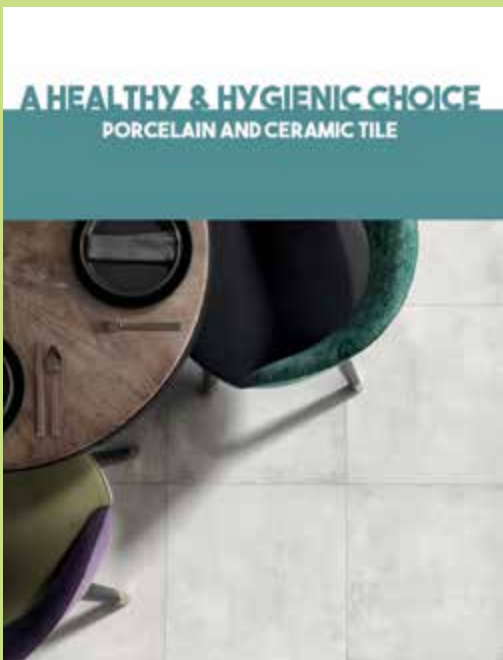
Flooring Ingredient Comparison Chart

Ingredient	Vinyl Flooring	Laminate Flooring	Engineered Wood Flooring	Solid Wood Flooring	Ceramic Tile
VOCs	▼	▼	▼	▼	●
Formaldehyde	▼	▼	▼	●	●
Phthalate	▼	●	●	●	●
Organotin	▼	▼	●	●	●
Allergens	▼	▼	▼	●	●
Plastic	▼	●	●	●	●

TCNA BULLETIN: CERAMIC TILE FOR A SAFE AND HEALTHY HOME

KEY: ▼ CONCERN ○ FREE FROM CONCERN

→ [Flooring Ingredient Comparison Chart](#)



→ [Ceramic Tile Hygiene Guide](#)

→ [TCNA Tile The Natural Choice](#)

Life-Cycle Costs for Various Floor Finishes

→ [Life-Cycle Cost Chart](#)

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

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).

Where's your next project?
Anywhere is the perfect place for tile.



Green Building Programs

	Leadership In Energy and Environmental Design (LEED v4.1)	2021 International Green Construction Code (ASHRAE Standard 189.1)	NAHB National Green Building Standard (ICC/ASHRAE 700-2020)	ANSI/GBI 01-2021 Green Globes
Multi-attribute sustainability: conformance to Green Squared®	Pilot Credit—Certified Multi-Attribute Products and Materials	901.4.1.4.3 (9.4.1.4.3) Third-Party Multi-attribute Certification	612.2 Sustainable Products	10.2.1.1 Third-Party Multiple-Attribute Product Certification
LCA or EPD	Environmental Product Declarations	901.4.1.4.1 (9.4.1.4.1) Industry-Wide Declaration 901.4.1.4.2 (9.4.1.4.2) Product-Specific Declaration 901.4.1.4.4 (9.4.1.4.4) Product Life Cycle	611.1 Product Declarations	10.2.1.1 Cradle-to-Gate EPD 10.2.1.2 Cradle-to-Grave EPD
Recycled Content	Sourcing of Raw Materials	901.4.1.1.1 (9.4.1.1.1) Recycled Content	604.1 Recycled Content	10.4.1 Sustainable Material Attributes
Product Reusability / Recyclability	Sourcing of Raw Materials	901.4.1.1.2 (9.4.1.1.2) Salvaged Material Content	603.1 Reuse of Existing Building 603.2 Salvaged Materials 605.3 Onsite Recycling 605.4 Recycled Construction Materials	10.5.1 Reuse Structural/Non-Structural Elements 10.5.2 Reused, Refurbished, and Salvaged Materials
Regional Materials	Building Product Disclosure and Optimization—Sourcing of Raw Materials	901.4.1.2 (9.4.1.2) Regional Materials	609.1 Regional Materials	N/A
Construction/ Design Management	Integrative Process Construction Indoor Air Quality Management Plan Indoor Air Quality Assessment Construction and Demolition Waste Management	901.3.1 (9.3.1) Construction Waste Management 1001.7.2 (10.7.2) IAQ Monitoring	605.2 Construction Waste Management Plan	6.1.2 Integrated Design Process 6.2 Environmental Mgmt. During Construction

→ [Green Building Credits Table](#)

Green Building Programs

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Indoor Environmental Quality	Low-Emitting Materials Thermal Comfort Interior Lighting	801.4.2.1 (8.4.2.1) Adhesives and Sealants 801.4.2.3 (8.4.2.3) Floor Covering Materials 801.4.2.6 (8.4.2.6) Ceiling and Wall Assemblies and Systems	901.7 Flooring Materials 901.8 Wall Coverings 901.10 Adhesives & Sealants	11.2.1 Volatile Organic Compounds
Heat Island Effect	Heat Island Reduction	501.3.5.1 (5.3.5.1) Site Hardscape	505.2 Heat Island Mitigation	7.3.4 Heat Island Effect
Energy Efficiency	Optimize Energy Performance	701.4.2 (7.4.2) Building Envelope 701.5 (7.5) Performance Option	702.2.2 Energy Performance Levels 703.2 Building Envelope	8.1.1C.1 Building Envelope
Inherent Durability	Building Life-Cycle Impact Reduction	1001.10 (10.10) Service Life Plan	602.1.6 Termite-Resistant Materials 602.1.11 Tile Backing Materials 901.6 Wall-to-wall Carpeting Not Installed	6.3.1B Building Service Life Plan
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	105.4 Innovative Approaches and Alternative Materials, Design, and Methods of Construction and Equipment 1001.9.5 (10.9.5) Building Green Cleaning Plan	601.3 Building Dimensions and Layouts 601.7 Pre-Finished Materials	10.3 Product Risk Assessment

→ [Green Building Credits Table](#)