

Builder Notes

Brick: Green Building Design and Sustainability

Green building, energy efficiency and sustainability. These words have made their way into the minds and voices of home builders and home owners. And for good reason. Those who choose to construct a home according to green building principles are reducing the long-term impact of their home on the environment and on their wallet while increasing their quality of life. Today, genuine clay brick has proved its contributing role in green building design and sustainability.

Brick Manufacturing and Sustainability.

Modern brick manufacturing has captured great efficiencies and incorporates many sustainable practices. Made primarily from clay and shale, brick comes from abundant natural resources. Most brick manufacturing plants stand in close proximity to their raw materials. In fact, numerous manufacturers transport their shale or clay one mile or less from the pit to the plant. However, sustainability doesn't end at the manufacturing process. Brick manufacturers also reclaim their pit and mined areas by re-establishing vegetation or creating new ponds or lakes. Overburden and topsoil are replaced, and the resulting property can be reused.

Fired brick is inert by nature and can safely encapsulate many waste materials. During the brick-making process, post-industrial and post-consumer waste products can be added to the clay or shale.

Waste products such as stone dust, glass, bottom ash, tile and waste brick and clay are included by some brick manufacturers.

Sixty percent of brick plants use renewable materials in their manufacturing processes. Burn-out materials, such as sawdust and rice hulls, are added to produce lower-weight brick units with fewer raw materials. A majority of plants also use scrubbers to control kiln emissions, and many recycle the waste lime/limestone material generated by the scrubbers.

Very little material is wasted during the brick manufacturing process. Water, often supplied from recycled or public sources, is used very efficiently—almost 99 percent is recycled or emitted back into the environment as steam. The same efficiency may be found with the bricks themselves. On average, only 3 percent of brick units are rejected—and the rejects are recycled back into the manufacturing process. Culled brick units are also crushed for use in landscaping or for other purposes. The majority of manufacturers have a reclamation program in place for unsold brick and brick packaging material.

Brick manufacturers have significantly reduced the amount of energy required to produce brick. In the past, it took approximately 4000 BTU per pound of brick to mine, manufacture, and transport brick. In 2007, it took just 1239 BTU per pound. This increase in efficiency comes not just from new plants, but also from

older plants where manufacturers have made a commitment to higher energy efficiency. In fact, more than 80 percent of plants have recently made improvements to reduce energy usage. Some plants have even begun to use renewable or alternate energy sources such as landfill gas, a highly beneficial means of disposing of potent greenhouse gases.



Brick manufacturers reclaim pit and mined areas when operations are completed by re-establishing vegetation or creating new ponds or lakes.

Brick Masonry Construction and Green Building/Sustainable Design.

Brick masonry construction can play an important role in building green, sustainably designed homes. In the U.S., two primary green building rating systems are used to evaluate the majority of homes: the U.S. Green Building Council's LEED™ for Homes or ICC and NAHB's 2008 National Green Building Standard, which is ANSI accredited and based on the earlier NAHB Model Green Home Building Guidelines. The following table illustrates and compares the brick masonry contribution to each rating system.

COMPARISON OF LEED FOR HOMES AND NATIONAL GREEN BUILDING STANDARD

	LEED Homes, January 2008 edition: Brick can assist in contributing up to 23 points out of a possible 136 points	2008 National Green Building Standard published in January 2009: Brick can assist in contributing up to 171½ points out of approximately 2000 possible points
ENVIRONMENTALLY RESPONSIVE SITES		
Urban Development (Infill Site). Brick masonry is suitable for and highly adaptable to urban infill projects. Many existing neighborhoods have brick homes—so new brick homes fit in.	Location & Linkage (LL) 3.1 – 1 point or LL 3.2 – 1 point	Site Design and Development (SD) 401.1 – 4 points; and Lot Design, Preparation, and Development (LD) 501.1 – 4 points
Location on Site. Site buildings to optimize solar radiation (passive solar heating and cooling possible).	Innovation & Design Process (ID) 1.5 – 1 point	SD 403.2 – 6 points
Minimum Slope Disturbance. Brick retaining walls can be used on steeply sloped sites.	Sustainable Sites (SS) 4.2 – 1 point	SD 403.3 – 6 points; and LD 503.2 – 6 points
Storm Water Design. Reduce quantity and improve quality of runoff with permeable brick pavements.	SS 4.1 – 4 points	SD 403.5 – up to 5 points; and LD 503.4 – up to 5 points
Reuse Existing Buildings. Brick masonry buildings can be renovated and reused; brick from buildings on site are reused.		SD 403.9 – 6 points; and Resource Efficiency (RE) 603.1 – up to 12 points
ENVIRONMENTALLY PREFERABLE MATERIALS		
Materials That Do Not Contribute to Urban Heat Island Effect. Light-colored brick pavers reflect heat and reduce the heat island effect.	SS 3 – 1 point	LD 505.2 – 4 points
Structural Systems That Optimize Material Use. Engineered design, rather than empirical design, of brick walls provides better utilization of materials.		RE 601.2 – 3 points
Building Dimensions Designed to Minimize Waste. Brick's small size and modular dimensions will always meet this requirement.	Materials & Resources (MR) 1.2 – 1 point; and MR 1.3 – 1 point	RE 601.3 – 3 points
Materials That Do Not Require On-Site Finishes. No field-applied finishes are required on brickwork; brick can be used indoors as well as on the exterior.		RE 601.7 – 2 or 5 points for each material
Foundations That Require Less Material. Pier and panel foundations of brick meet this practice.		RE 601.8 – 3 points
Wall Systems That Provide Sufficient Structural and Thermal Characteristics. Brick-bearing walls provide both structure and thermal mass.		RE 601.9 – 4 points
Salvaged Materials. Salvaged brick and pavers can be reused.	MR 2.2 – ½ point per product	RE 603.2 – 3 points
Recycled Content. Brick may contain recycled ceramic tile, glass and metallic oxides. Mortar and grout may use fly ash.	MR 2.2 – ½ point per product	RE 604.1 – up to 6 points
Recycling of Construction Wastes. Brick and packaging are 100% recyclable.	MR 3.2 – up to 3 points	RE 605.2 – 7 points; and RE 605.3 – 1½ points
Materials Made with Renewable Energy. Several brick manufacturers use landfill gas or sawdust to fire their brick.		RE 606.3 – 2 points for each material
Materials Made with Less Content. Hollow brick, brick with less than 3-in. width and adhered veneer brick take less material and energy to make and ship.		RE 607.1 – 3 points for each material
Regional Materials. Brick manufacturing plants are located near raw materials and are available throughout the United States.	MR 2.2 – ½ point per product	RE 608.1 – 2 points per material
Life Cycle Assessment. Brick is included in the Life Cycle Assessment tools such as BEES and the Eco-Calculator.		RE 609.1 – 3 points per product
Product Manufacturer is ISO Certified. Several brick manufacturers have ISO 14001 certification.		RE 610.1 – 1 point per percent up to 10 points
Passive Solar Design and Thermal Mass. A real plus for brick construction. Brick walls greater than 3 in. thick slow the transfer of heat.	Energy & Atmosphere (EA) 1 – up to 34 points (about 1-2 points from brick)	Energy Efficiency (EE) 703.1.3 – up to 6 points; and EE 704.3.1 – up to 10 points
Masonry Fireplaces and Heaters. Fireplaces with gasketed doors, outside combustion air and a means of sealing the flue provide heat without compromising indoor air or heat loss. Masonry heaters of brick are energy efficient and clean burning.	Indoor Environmental Quality (EQ) 2.2 – 2 points, masonry heaters only	EE 703.2 – up to 15 points; and Indoor Environmental Quality (EQ) 901.2.1 – 4 points for fireplaces; 6 points for heaters
Materials Which Do Not Emit Volatile Organic Compounds (VOCs). Brick does not have any VOCs. Use exposed brickwork inside the home to meet this requirement. May have to request LEED Innovation points.	ID 3.1 – 1 point	EQ 901.8 – 5 points
DURABILITY AND DESIGN OR SERVICE LIFE		
Termite-Resistant Materials in Areas of Termite Infestation. Insects do not eat brick.	SS 5 – up to 1 point	RE 602.8 – up to 6 points
Flashing. Flashing is always present in a well-detailed brick home.		RE 602.12 – 6 points
Durability Management Process. Brick, with its long life and renowned durability, is an important part of a home's durability.	ID 2 – 3 points	



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