

BRICK NOTES

CHOOSE BRICK FOR ENERGY SAVINGS

BRICK MEETS THE STRICT ENERGY CODES AND BEATS THE COMPETITION.



When thinking about a brick home, you might think of the beauty, low maintenance, safety or durability...but did you know that a brick home can reduce your energy bills? Typical clay brick wall construction using batt insulation alone meets the strict Residential Provisions of the 2018 International Energy Conservation Code^(R) (IECC) for 85% of the U.S.

And when a thin layer of continuous insulation is added, it satisfies requirements in even the coldest parts of the country. In addition, recent research of common residential wall assemblies shows brick reduces the amount of heat that transfers through the wall up to 50% better than fiber cement, vinyl or even EIFS (synthetic stucco).*

*Source: Sanders, J.; Carrier, J.; Clark, C.; and Huygen, N., "Dynamic Thermal Performance Measurements of Clay Brick Masonry," 13th Canadian Masonry Symposium, Halifax, Nova Scotia, Canada, 2017.

HOW DOES BRICK SAVE SO MUCH ENERGY?

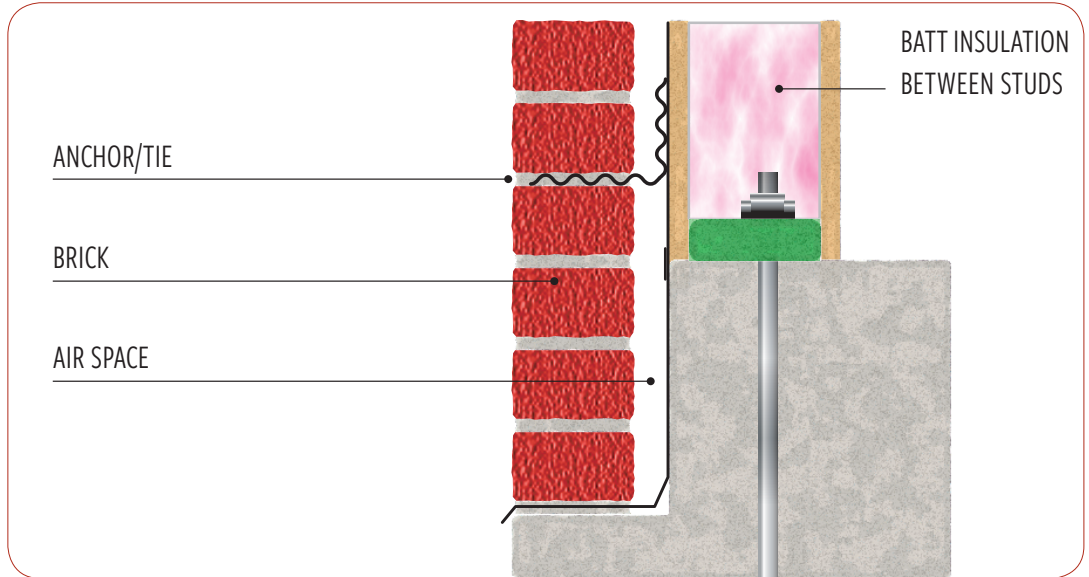
Modern brick homes are built in layers. Behind the sheetrock on the interior of a wall, there typically is a wood stud wall with batt insulation between the studs. Then comes a layer of sheathing, on which continuous insulation can be mounted.

The unique energy-saving potential of brick construction comes into play once you get past the insulation. Between the inner wall and the exterior brick, an air cavity provides both moisture control and a thermal break with additional insulating properties. Some might think the weep holes used to control moisture or the metal wire used to tie the inner wall to the exterior brick would hurt performance, but testing shows the impact to be insignificant.

To top it all off, a layer of exterior brick, often called brick veneer, is added. While many admire the lasting beauty of the way brick looks, the real beauty is in how the thermal mass of brick performs to save energy and save you money.

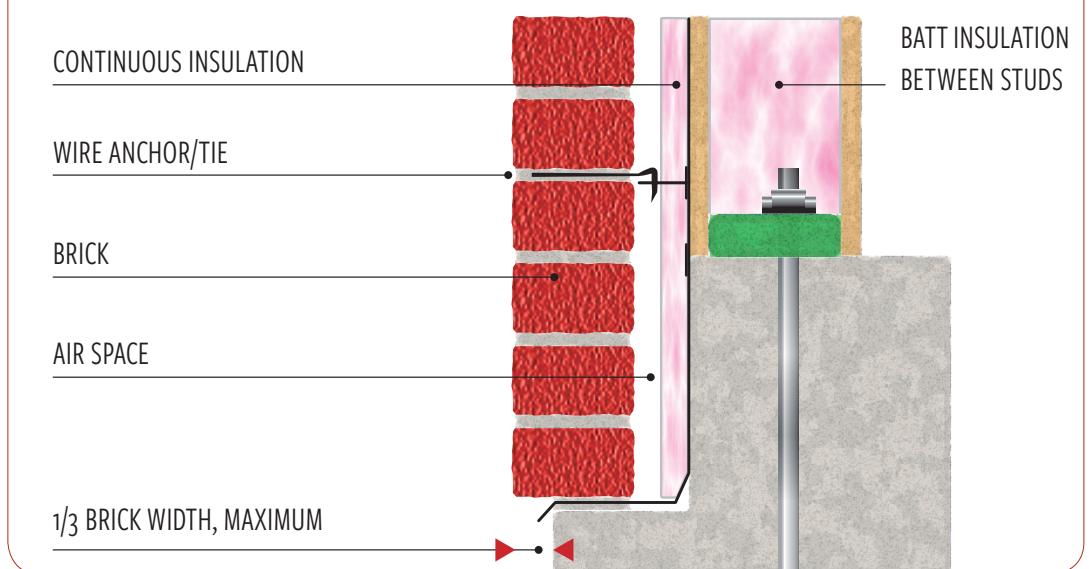
COMPARED WALL SYSTEMS

TYPICAL



WITH CONTINUOUS INSULATION

NOTE THAT THE ADDITION OF CONTINUOUS INSULATION REQUIRES THE USE OF WIRE ANCHORS/TIES.

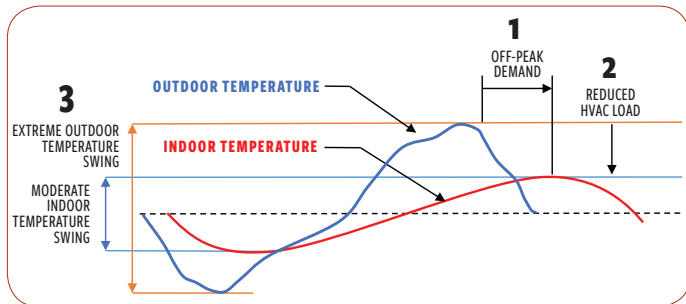


THERMAL MASS MAKES THE DIFFERENCE.

If you have ever put a heavy cast-iron pot on a stove and waited for water to start boiling, you are already familiar with thermal mass. While the flame beneath it burns away at hundreds of degrees, the mass of the pot and the water in it take a while to get up to temperature. After you turn off the stove, the heavy pot also takes a while to cool off again.

In brick construction, the thermal mass of the tons of masonry surrounding your home works in a similar way. During the hottest part of the day, the exterior layer of brick warms up slowly. During the coldest nights, it cools off slowly. At the same time, any heat or cold from the interior that gets past the insulation in the wall is slowly absorbed, stored and released.

THERMAL MASS REDUCES THE INDOOR TEMPERATURE SWING AND SHIFTS THE IMPACT OF TEMPERATURE EXTREMES TO OFF-PEAK HOURS.



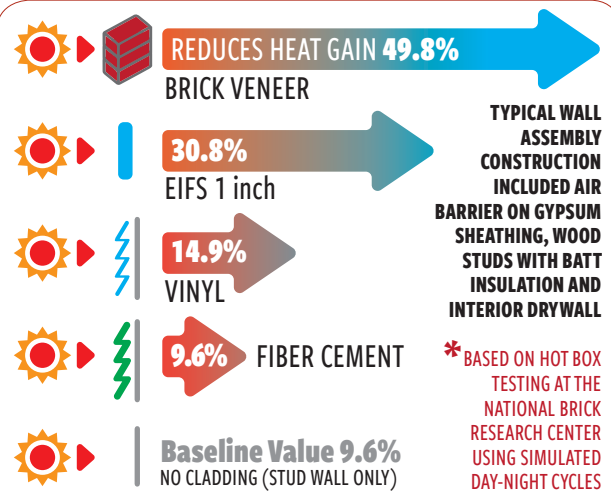
START LATE, AND KEEP TEMPERATURES SLOW AND STEADY.

With the thermal mass of brick surrounding your home, the impact of the coldest parts of the night and the hottest parts of the day are leveled out. In milder seasons, this can mean months of comfort without needing to run your heat or air conditioning (AC) at all. Since heating and cooling are the largest energy consumers in the home, that can lead to significant savings.

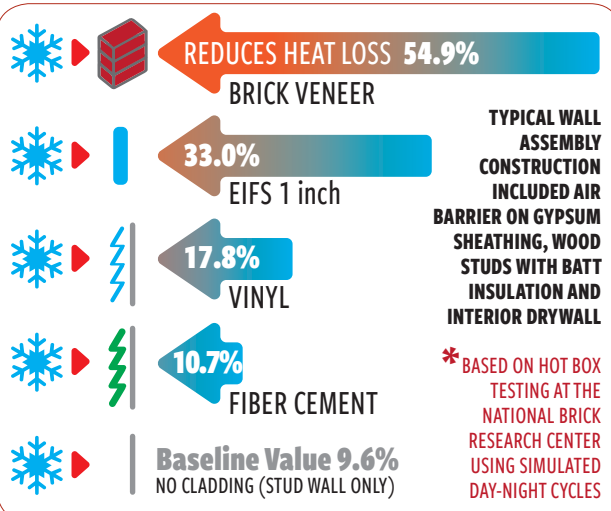
When it comes time to turn the heat or AC on, it takes almost a day for heat to travel from one side of a typical brick wall to the other; that's almost twice as long as the closest competing wall assembly and three times longer than wall assemblies clad with vinyl or fiber cement.*

As temperatures rise and fall going from day to night, the heat flow changes direction before reaching the other side, resulting in less heat making it all the way through the wall. Overall, about half as much energy makes it through the wall. Where you live and the number and type of doors and windows also affect energy usage. But when comparing wall to wall alone, brick can add up to more than 30% in energy savings.**

REDUCTION OF HEAT GAIN THROUGH WALL IN SUMMER*



REDUCTION OF HEAT LOSS THROUGH WALL IN WINTER*



BRICK'S THERMAL MASS CAN CUT COSTLY PEAK ENERGY USE.

During the summer especially, we tend to use the most electricity at home in the evening, when people get home from work. Temperatures climbing to their daily highs puts a strain on both air conditioning systems and the utilities powering them. To relieve some of the peak demand on the grid, many utilities are implementing Time Of Use (TOU) billing. In these systems, the price you pay for electricity can more than double during peak hours.*** While this disincentive to use energy during peak times is great for the utilities, it can become very costly for homeowners. You may not have TOU billing yet, or it may currently be optional, but there is a good chance it will come to where you live before you leave your home.

*Source: Sanders, J.; Carrier, J.; Huygen, N., "Dynamic Thermal Performance Measurements of Residential Wall Systems," ASTM STP 1612, Masonry 2018 Symposium: Innovations in Collaborative Research, Development and Applications, San Diego, CA, 2018. And Huygen N. and Sanders J. (2019, June). "Dynamic Thermal Performance Measurements of Residential Wall Systems Part II, with Numerical Validation of Steady-State Performance." P.B. Dillon & F.S. Fonseca (Eds.), Proceedings of the Thirteenth North American Masonry Conference. Paper presented at the 13th North American Masonry Conference, Salt Lake City, Utah (pp. 240-251). Longmont, CO: The Masonry Society.

**Based upon simulation results of BTU/ft² wall area/yr. For all cities, 13 SEER AC and electric heating were assumed.

***"SDG&E's March 2019 systemwide offering will have two TOU plans, both built around a 4 p.m. to 9 p.m. peak period priced at \$0.47/kWh, Rate Reform Project Manager Katelin Scanlan told Utility Dive. The utility will also offer an off-peak price of \$0.22/kWh and a super off-peak period from midnight to 6 a.m. at \$0.16/kWh."

<https://www.utilitydive.com/news/california-utilities-prep-nations-biggest-time-of-use-rate-roll-out/543402/>

MORE THAN R-VALUE ALONE, BUT BETTER TOGETHER

R-value, or the resistance against heat transfer through a material, is commonly used when determining thermal energy efficiency. But many regulators, builders, and material marketers have ignored the bigger picture. Selecting a cladding based on R-value alone is an overly simplistic approach that does not take into account the performance of the entire wall system. Wall systems that incorporate insulation combined with the thermal mass of brick and the air space behind it can provide substantial energy savings.

When testing is done on typical stud walls clad with brick compared to those clad with vinyl siding or fiber cement (such as Hardie board), brick construction pulls a few percentage points ahead in R-value due to the air cavity behind the brick. However, when testing the performance of the entire wall system under typical daily temperature fluctuations, brick's thermal mass can cut estimated real-world energy consumption significantly, more than what the R-value difference suggests. For Atlanta, Georgia, brick walls outperform vinyl by over 22% and perform almost 29% better than fiber cement.

R-VALUE VS. YEARLY THERMAL ENERGY

WALL SYSTEM	STEADY-STATE		REAL-WORLD ESTIMATES OF ENERGY USAGE
	R-VALUE	RELATIVE THERMAL PERFORMANCE	
MODULAR BRICK VENEER	13.7	BEST PERFORMANCE	
FIBER CEMENT	12.6	8.0% WORSE THAN BRICK	28.6% WORSE THAN BRICK
VINYL SIDING	13.2	3.6% WORSE THAN BRICK	22.2% WORSE THAN BRICK

BASED UPON SIMULATION RESULTS OF BTU/ft² WALL AREA/YR.



All wall systems had the same 2x4 wood stud R-13 wall. Only the cladding was changed. Real-world energy simulated for Atlanta, GA – average wall orientation, 13 SEER AC and electric heating.

THOUSANDS OF YEARS OLD, BUT THE INNOVATION HASN'T STOPPED

Brick was used to build ancient civilizations, but new improvements to the material and how it works with other wall components have dramatically improved energy efficiency. Relatively recent innovations, such as adding just a half-inch of rigid foam continuous insulation to a slightly larger air cavity, have increased the already impressive energy savings of a brick wall by more than 21%.* This technology is already being used in many parts of the country to fight the harshest winters.

But the innovation doesn't stop there. New research shows that adding a thin radiant barrier to the wall can provide additional double-digit improvements. The Brick Industry Association is currently working with regulators to incorporate this innovation and develop future innovations that will make brick homes even more efficient in the future.

STRONG, SAFE, BEAUTIFUL AND EFFICIENT

People have many different reasons for choosing to build their dream homes with brick. But whether you choose brick for its durability, fire and wind resistance, low maintenance, or timeless and enduring beauty, know that you are also choosing one of the best ways to save on energy in your home.



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*Based upon simulation results of BTU/ft² wall area/yr. Confirmation testing scheduled for spring of 2019.