

# COMBAT RISING ENERGY COSTS

## with Concrete Masonry Units

WHITE PAPER

by the Southeast Concrete Masonry Association

[scmaonline.org](http://scmaonline.org)





# Table of Contents

I  
**Introduction**

II  
**CMU Thermal Mass**

- Understanding Energy Efficiency
- Understanding R-Value
- Energy Cost Savings Using CMUs

III  
**DOE Codes and Compliance**

- Codes 101
- Energy Efficient Building
- Commercial and Residential Building Code
- COMcheck

IV  
**Wall System Energy Efficiency**

- Masonry vs. Wood

V  
**Conclusion**

I  
**Cut Energy Bills with Concrete Masonry Units**

Energy costs continue to rise throughout the United States, taxing home and business budgets and driving new emphasis in energy efficient materials for construction projects, both new and existing.

Concrete masonry units – or CMUs – are at the forefront of the construction conversation. In addition to its proven longevity and durability, CMU construction offers unmatched energy efficiency because of its ability to hold in cool air in the summer months and radiate warm air in the winter months.

A well-constructed CMU wall is airtight, meaning energy doesn't escape through wall leaks, which can add up to monthly savings on a property's energy bills.

That's important because in 2022 heating and cooling costs soared for electricity, natural gas and liquid propane, spurred by changing weather patterns and a changing global economy.

Electricity bills increased 15.8% between August 2021 and August 2022, the largest increase since 1981, according to the U.S. Bureau of Labor Statistics. Natural gas prices



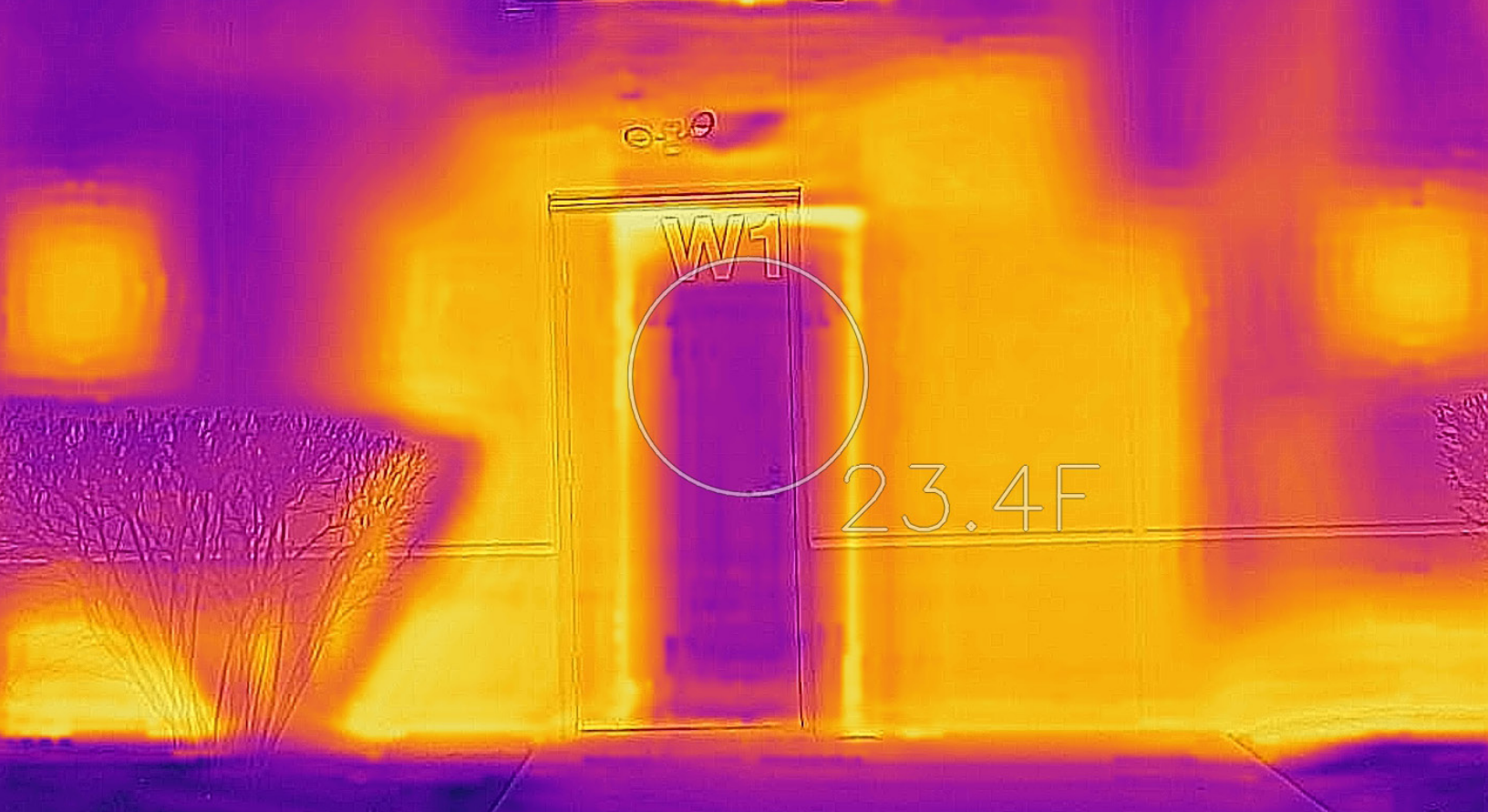
jumped a staggering 33% during the same timeframe, the bureau reported.

Winter is bringing additional increases as the economy is still recovering from the pandemic, deals with the European energy crisis triggered by Russia's war in Ukraine.

CMU construction can be customized to the specific energy needs of any build, creating a comfortable inside temperature year-round while helping to lower heating and cooling bills.







## || CMU Thermal Mass = Energy Efficiency

### Understanding Energy Efficiency and Thermal Mass

A key measure of a structure's energy efficiency is its thermal mass. This term describes the ability of a material to absorb and hold heat, something that's important to keeping the inside temperature steady while the outside temperature rises and falls.

CMUs have a high thermal mass because of their thickness and weight. By comparison, lighter-weight materials, such as wood, don't have the ability to store heat and as a result have a low thermal mass.

The higher the thermal mass, the better the structure's energy performance because the construction materials themselves work to regulate heat. Here's how: Concrete block walls warm up during the hottest part of the day and then shed that heat at night, when the outside temperature drops. This helps keep the interior temperature cool during a summer day and warm during winter nights.

### The Difference Between R-Value and Thermal Mass

"Resistance value," or "R-value," is a measurement for insulation materials that are used to create a barrier between the inside and outside temperature.

R-values measure the resistance of heat flowing through each layer of insulation based on its thickness. The higher a product's R-value, the better it is at protecting a

structure from temperature extremes, keeping heat outside in the summer and inside in the winter.

Similarly, a U-factor is a formula used to estimate the amount of heat lost through an entire wall system. The lower a structure's U-factor, the better it is at retaining heat.

Both measurements factor into a structure's energy efficiency. Good insulation paired with CMU construction's high thermal mass, which actively moves heat inside or outside, will lead to greater savings on a building's heating and cooling bills.

### Energy Cost Savings using Concrete Masonry Units

Concrete block with its higher thermal mass offers more energy efficiency than light-frame buildings, which must rely on heavier insulation. Additionally, CMU construction helps HVAC systems reach peak efficiency by radiating heat, helping warm the interior at night during winter or releasing excess heat at night in summer, lessening demand on air conditioning systems.

For example, a 100,000-square-foot block structure stays warmer in winter and cooler in summer, saving you up to \$1,200 per month in utility costs compared to a frame structure of the same size. For a 200,000-square-foot structure, the utility cost savings would be \$2,400 a month.

This is where concrete masonry significantly



outperforms the other systems. You can expect significant savings on your heating and cooling bills compared to other materials.

Additionally, because concrete block is higher-density, they do not require the same heavy insulation that a timber-frame structure needs to comply with standard energy codes.

## ||| Department of Energy Codes & Compliance

### Understanding U.S. DOE Codes 101

Because the United States does not have a national building code — the codes vary from state to state and from county to county — the U.S. Department of Energy (DOE) supports the building energy code developed by two other, independent groups: the International Code Council (ICC), which creates residential and commercial energy codes, and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), which also writes commercial energy code.





The DOE offers its expertise through technical research and its ability to regularly review model codes. For example, codes used today provide more than 30% savings in energy costs than those used a decade ago, according to the DOE.

These codes set the minimum requirements for all things energy in new construction or renovations, such as requirements for windows and insulation, with the goal of conserving energy and lowering energy costs for the public. The DOE also works with localities to promote adoption of these national standards.

When used and verified, building energy codes reduce a structure's energy costs, lessen its carbon footprint, and make it attractive for resale.

### The Elements of an Energy Efficient Building

To maximize energy savings requires a full-building approach, taking advantage of every opportunity to cut energy use, such as the construction materials chosen, the heating and cooling system installed, and even the types of lightbulbs used. None of this affects the look or capabilities of a structure. It simply means the structure is created and operated in an environmentally friendly manner.

Energy efficient buildings use construction materials, such as CMUs, with a high thermal mass, taking advantage of their ability to conduct heat and protect the interior from temperature changes happening externally.

These structures are properly insulated and use effective moisture barriers, protecting

against air leaks and dampness. High-efficiency heating and cooling systems and smart devices, such as occupancy sensors and programmable thermostats, to further save energy by turning off light or ventilation during off hours or when spaces are not being used.

### Commercial and Residential Energy Codes

ASHRAE's commercial building code is called "Standard 90.1" and sets energy standards for most buildings, with the exception of low-rise residential structures. The codes apply to new construction, renovations of existing buildings and the addition of new systems to existing buildings. Standard 90.1 is revised every three years through a public process.

The ICC maintains the International Energy Conservation Code. It's also updated every three years through a public process. The code differentiates the guidelines for commercial and residential buildings. Its residential guidelines apply to residential buildings or three or fewer stories, including both single-family and multi-family units. All other structures fall under the commercial portion of the code.

### Use COMcheck for Energy Code Compliance

Because a locality's actual energy codes can vary from place to place, a software



called COMcheck is available to help the construction team, from architects to contractors, ensure a project meets the most current ICC or ASHRAE energy codes, as well as any state energy codes that may be in play. COMcheck can also aid building officials and inspectors, saving them time on the jobsite.

COMcheck uses familiar language to demonstrate a project's compliance with energy code requirements related to envelope, lighting and mechanical systems. Once a user calculates the necessary square feet of a project, the software requires no other calculations or technical expertise with energy codes.

Note: When using COMcheck with CMU construction, you will set the wall type to "mass wall" and input the U-factor of the wall system instead of the R-value of its insulation. This measures the entire wall system's efficiency instead of each of its components.

The software is available for use on the web or by a desktop download, and a help desk team is available.





## IV Wall System Energy Efficiency

### Masonry vs. Wood

Concrete block and wood offer similar R-values for their ability — by themselves — to create a barrier between exterior and interior temperatures. Both offer an R-value of between 7 and 11.

Where CMU construction soars above wood frame construction is its thermal mass, which is much higher. This means a concrete block structure needs far less additional insulation to reach the same energy savings. This

will save property owners in construction materials costs as well.

In Florida, for example, outside temperatures year-round exceed what's normally comfortable indoors during the day and drop below that temperature at night. Here, concrete block's thermal mass is especially effective in climate control and energy efficiency, and the state's building code recognizes this by assigning lower Summer and Winter Point multipliers to CMU walls.

Because of its temperature control, CMU construction additionally claims a superior ability to control condensation that occurs with greater temperature swings within the structure's walls. This helps prevent issues related to moisture and mold.

## V Conclusion

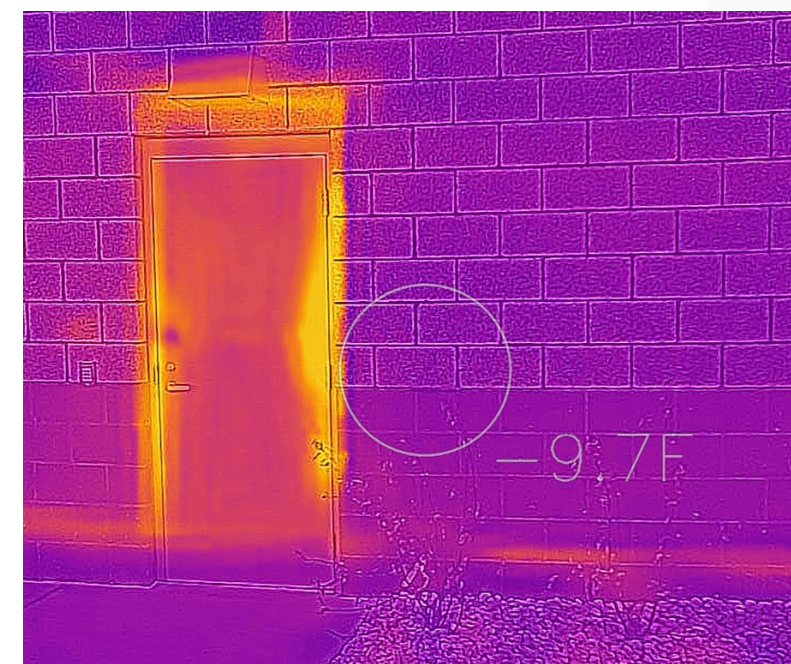
When it comes to energy efficiency, concrete masonry units rise above timber and steel frame construction because of concrete's inherent high thermal mass.

Concrete block's special ability to collect heat helps a building's interior stay warm or cool, depending on the season, throughout the day. That heat is then released during off-peak hours when temperatures drop. Because of that, concrete masonry walls require less insulation than other frame systems to meet building energy codes.

With CMUs at a structure's core, a building's HVAC system works less, cutting energy bills and decreasing the property's overall carbon footprint.

That's important as energy prices and concerns about climate change and global warming continue to rise around the globe.

Alongside its energy efficiency, concrete block is equally attractive for its durability, longevity, low maintenance, and ability to withstand natural and human-made disasters. This makes CMUs the premier choice for building, whether the final structure is residential, commercial or industrial.







179 Green Meadows Dr.  
Forest City, NC 28043  
704-228-0474  
[info@scmaonline.org](mailto:info@scmaonline.org)  
[scmaonline.org](http://scmaonline.org)