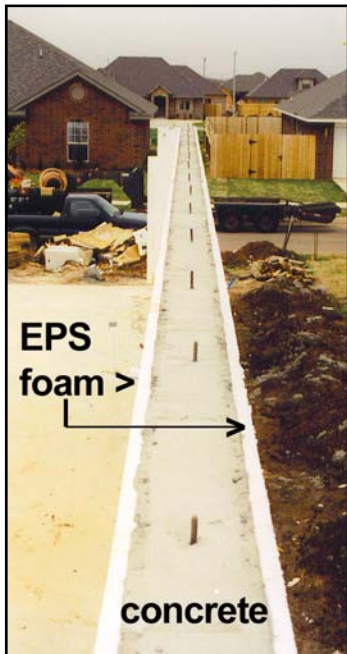
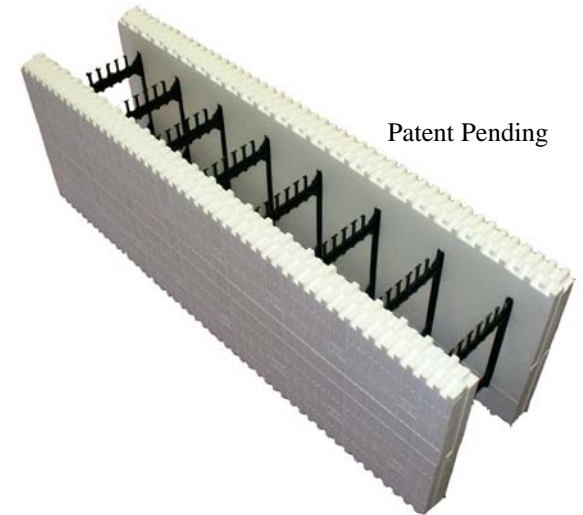


# ICFs...

**Easy. Affordable. Unbeatable.**

Whether you're building a home or a multi-level commercial structure, you can't beat the rewards of building with **BuildBlock™ Insulating Concrete Forms**. BuildBlock insulating concrete forms provide a lightweight, high-strength alternative to using steel or wood frame.



## What are insulating concrete forms?

Insulating concrete forms (ICFs) are hollow foam blocks which are stacked into the shape of the exterior walls of a building, reinforced with steel rebar, and then filled with concrete. ICFs combine one of the finest insulating materials, Expanded Polystyrene (EPS), with one of the strongest structural building materials, steel reinforced concrete. The result is a wall system of unmatched comfort, energy efficiency, strength and noise reduction.

## What's the difference between insulating concrete forms and insulated concrete forms?

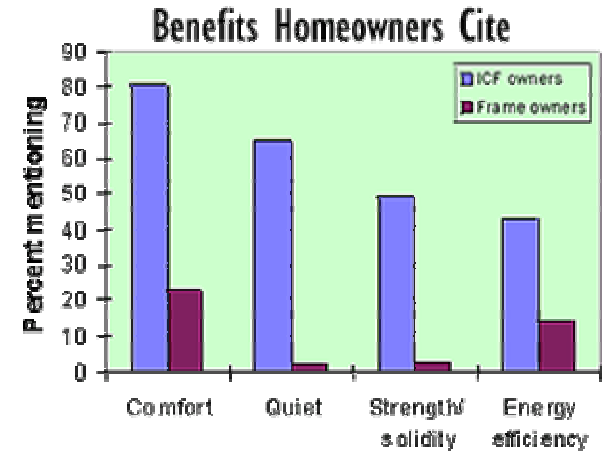
They typically refer to the same thing. However, the term *insulating* concrete form is more precise because it indicates that the insulating characteristic of the form is continuous and ongoing.

Insulating Concrete Form Structures are

# Comfortable & Quiet

When planning a new house, consider the greater well-being that comes from living with more even temperature, sharply reduced drafts, and noticeably greater quiet.

When surveyed, over 80% of ICF home owners mentioned the great comfort of their home, compared with just 22% of frame home owners.\*

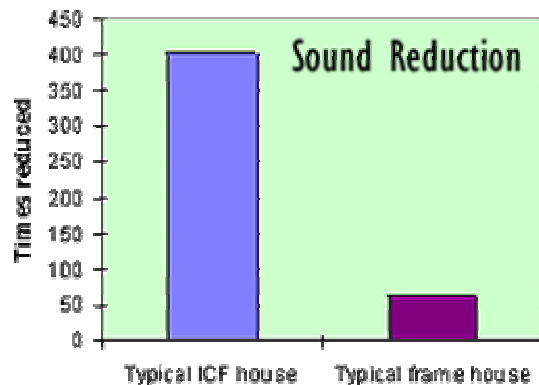


## Greater Comfort

The high thermal mass and minimal air infiltration of insulating concrete form walls create a **more uniform and stable temperature** throughout your home. You'll have **no more hot spots or cold drafts**.

## Healthier Air

ICF walls **reduce air infiltration by 75%**: The effects of hay fever, asthma, and other airborne allergies can be greatly alleviated as a direct result of the reduced leakage of outside air, which brings dust, pollen, and other pollutants. Indoor air pollution is a great health concern today. ICF walls are non-toxic. The measurement of air contents of actual ICF houses shows an almost complete absence of any emissions.



## Quieter

Insulating concrete form homes provide **unparalleled peace and quiet** and true protection from outside noise. In sound transmission tests, ICF walls allow less than one-third as much sound to pass through than regular frame walls.

\*Chart & data from the Portland Cement Association.



Insulating Concrete Form Structures are

# Energy Efficient

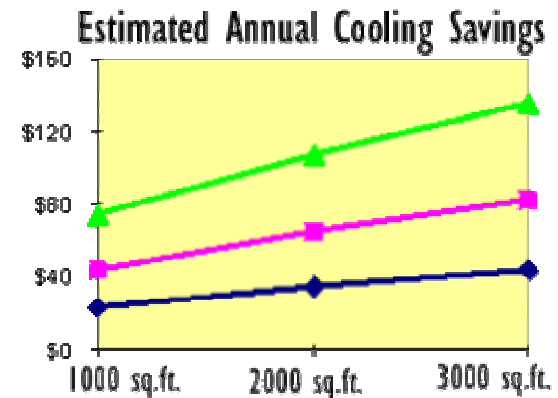
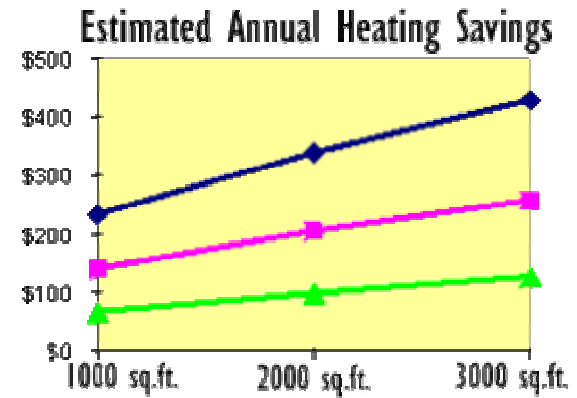
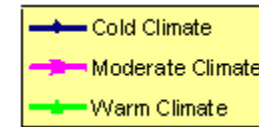
**Energy efficiency is the core feature of insulating concrete form construction because so many owner/occupant benefits stem from it.**

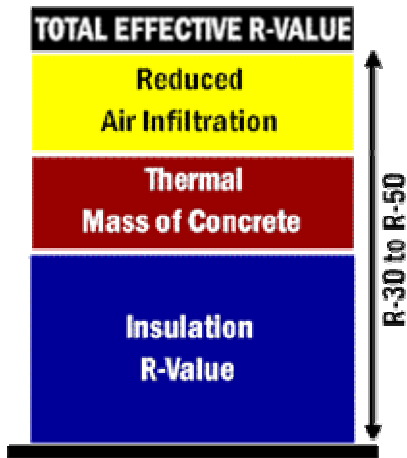
Actual studies show that homes built with ICF exterior walls require an estimated 44% less energy to heat and 32% less energy to cool than comparable wood frame houses.\*

However, homes and structures built with the proper complement of windows, doors, HVAC systems, and methods, generally accomplish at least a **50% savings in heating and cooling**. And in some cases, depending on the area and climate, homeowners experience as much as an 80% decrease in energy use and costs.

At a time when energy costs are soaring, many building owners are deciding it makes more sense to spend money on a safer, longer lasting, and more energy efficient structure than to spend that same money on utility bills.

NOTE: Charts and data from Portland Cement Association. Dollar amounts in example *have not been adjusted* for higher energy costs.





## Effective R-Value

The Total Effective R-Value performance of ICFs consists of three factors:

- (1) the R-Value of the expanded polystyrene,
- (2) the thermal mass of the concrete, and
- (3) the enormous reduction in air leakage (infiltration).

### Insulating Value

First, the R-Value of BuildBlock's polystyrene alone is R-20, compared to wood frame's R-9 to R-15. So ICF walls are expected to cut the conduction losses through foundation and above-grade walls by about half.

### Air Infiltration

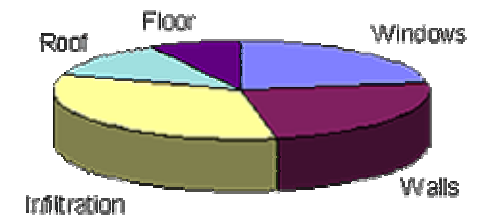
Air leakage accounts for as much as 40% of the heat load requirements of a wood framed structure. Nothing blows through solid concrete! ICF walls reduce air infiltration by about half, compared to wood frame.

### Thermal Mass

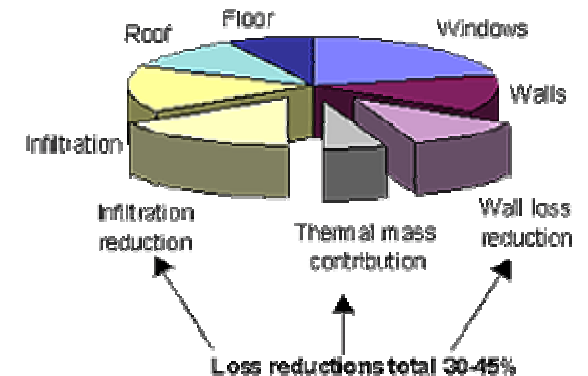
But ICF walls do more than cut down on the biggest types of energy loss. The concrete gives them the heat-absorbing property "thermal mass." This is the ability to smooth out large swings in temperature. It keeps the walls of the house a little warmer when the outdoor temperature hits its coldest extreme, and keeps the house a little cooler when the outdoor temperature is hottest.

As a result, with the combined performance of these three factors, ICF walls actually perform as high as R-50 in some areas of the country.

Sources of Energy Loss



Energy Loss Reduction



Insulating Concrete Form construction is

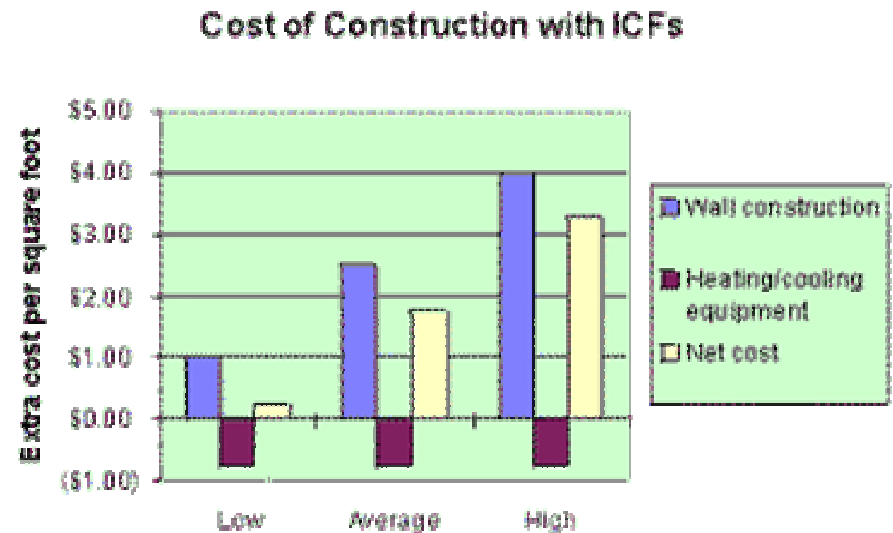
# Affordable

## A home built with insulating concrete forms is more affordable than you may think!

The old saying goes: “It takes money to make money.” It also takes money to save money. Insulating concrete forms cost a little more — about 3-5% on average — than traditional stick wall construction, but that additional investment is **quickly recouped by the tremendous savings in energy, interest, and insurance costs.** Then consider the **reduced maintenance costs** and **higher resell value** and you can see why insulating concrete home structures are actually *more affordable* than wood construction!

## How much does an ICF house cost?

Typical new U.S. homes cost \$60-100 per square foot. Building walls of ICFs adds \$1.00-\$4.00 to this figure. But since ICF houses are more energy-efficient, the heating and cooling equipment can be smaller than in a frame house. This can cut the cost of the final house by an estimated \$.75 per square foot. So the net extra cost is about \$.25-\$3.25.



Insulating Concrete Form construction is

# Affordable

## Increased Home Value

Not planning on staying in your home for more than a few years? A recent study conducted for the EPA Energy Star Homes Program concludes that **home value increases by about \$20 for every \$1 reduction in annual utility bills**. This means you can profit by investing in energy efficient homes even if you're uncertain about how long you might stay in the home. You'll enjoy positive cash flow for as long as you live in your home and can also expect to recover your investment when you sell the home.

## Insurance Savings

Because ICFs are included in the masonry construction class, they qualify for a **lower premium** than a home in the traditional wood frame class. Also, more and more insurance providers are recognizing the fire and natural disaster-resistance of insulating concrete form structures and are offering special discounts on top of those lower premiums. (Check with local agents for availability in your area.)

## Mortgage Qualification

Because of the proven energy savings, certain mortgage companies offer "Energy Efficiency" Home Mortgages which take into consideration the decrease in energy costs. This allows you to qualify for a higher mortgage payment. **That means you're taking that same money which would be going to the utility companies and instead putting into your home!**

Insulating Concrete Form structures are

# Safe and Strong

For many people, the greatest benefit of an ICF home is the peace of mind that comes with being surrounded by the strength of concrete and steel. Insulating Concrete Forms create a monolithic concrete wall that is 10 times stronger than wood framed structures.



## Fire Resistant

In fire wall tests, ICFs stood exposure to intense flame without structural failure longer than did common frame walls. The **extremely low flame spread** and **smoke development** make ICF walls safer from the hazard of fire.



## Earthquake Resistant

Built according to good practices, concrete homes can be among the safest and most durable types of structures in an earthquake. Homes built with reinforced concrete walls have a record of surviving earthquakes intact and structurally sound.



## Tornado and Hurricane Resistant

In severe weather, the walls of your ICF home provide protection for your family that is far superior to wood frame construction. A Texas Tech University study proves that walls built with Insulating Concrete Forms (ICFs) **withstand the damage and projectiles launched by tornado and hurricane strength winds**. A **Safe Room** is the perfect complement to an ICF home.

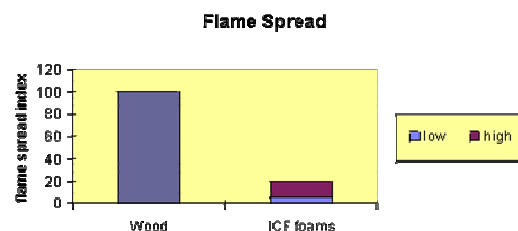
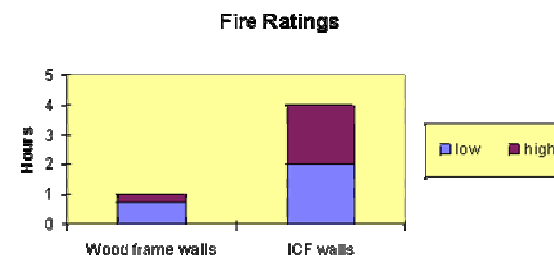
## Fire Resistance of Concrete Homes

Of all construction materials, concrete is one of the most resistant to heat and fire. That fire resistance gives houses built with insulating concrete forms certain safety advantages. And those advantages give builders and buyers yet another reason to consider using ICFs for their next project.

### How well do ICF walls hold up in a fire?

Unlike wood, concrete does not burn. Unlike steel, it does not soften and bend. Concrete does not burn until it is exposed to thousands of degrees Fahrenheit -- far more than is present in the typical house fire.

This has been confirmed in so-called "fire-wall" tests. In these tests, ICF walls were subjected to continuous gas flames and temperatures of up to 2000°F for as long as four hours. None of the ICF walls ever failed structurally. All of the ICFs tested were of the "flat" or "uninterrupted grid" type, having no significant breaks in the concrete layer [like BuildBlock ICFs]. In contrast, wood frame walls typically collapse in an hour or less.



### Do they stop fire from spreading?

Concrete walls have also proven more resistant to allowing fire to pass from one side of the wall to the other. This is especially of interest in areas with brush fires that could spread indoors.

The fire wall test confirms this rule for ICFs once again. Part of the test measured how well the wall slows the passage of heat and fire from the side with the flame to the other side. The ICF walls tested did not allow flames to pass directly through. They also did not allow enough heat through to start a fire on the cool side for 2-4 hours. In contrast, wood frame walls typically allow both flame and fire-starting heat through in an hour or less.

### Will the foam add fuel to the fire?

The foams in ICFs are manufactured with flame-retardant additives. These prevent the foams from burning by themselves. If you hold a match to the material, it will melt away.

Of course, in a house fire the foam may be subjected to constant flame from other materials burning nearby (wooden floors, fabrics, etc.). The "Steiner Tunnel Test" measure how much a material carries fire from an outside source. In the test, technicians line a tunnel with the material, run a fire at one end, then measure how far the flame spreads. The flames travel about one-fifth as far down a tunnel lined with ICF foams as they spread down a tunnel lined with wood.

### Can the foam give off harmful emissions?

Practically any organic material, be it wood or plastic, gives off emissions when it is subjected to intense heat or flame. The Southwest Research Institute reviewed the numerous existing studies of fire emissions and concluded that the emissions from polystyrene foams are "no more toxic" than those of wood.

# Concrete Homes Stand Up to Earthquakes

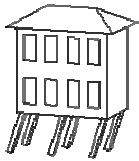
**In reinforced concrete construction, the combination of concrete and steel provides the three most important properties for earthquake resistance: stiffness, strength, and ductility.**

## Why Buildings Survive

Studies of earthquake damage consistently show well-anchored shear walls are the key to earthquake resistance in low-rise buildings. Optimal design conditions include shear walls that extend the entire height and located on all four sides of a building. Long walls are stronger than short walls, and solid walls are better than ones with a lot of opening for windows and doors. These elements are designed to survive severe sideways (in-plane) forces, called racking and shear, without being damaged or bent far out of position. Shear walls also must be well anchored to the foundation structure to work effectively. Properly installed steel reinforcing bars extend across the joint between the walls and the foundation to provide secure anchorage to the foundation.

## Why Buildings Fail

Low-rise buildings most vulnerable to earthquakes do not have the necessary stiffness, strength, and ductility to resist the forces of an earthquake or had walls that were not well anchored to a solid foundation, or both. Three types of buildings sustained the most significant damage:

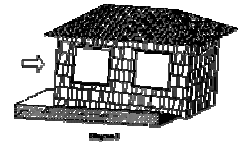


### Multi-story buildings with a ground floor consisting only of columns:

Most of these buildings were 3 to 4 stories tall with a parking garage or a living area with many large windows on the ground level. The columns may have been strong enough to hold up the structure, but did not provide an adequate amount of racking resistance during a seismic event. When the earthquake shook the building side-to-side, the upper stories sometimes tipped over to one side. Whether built of wood, steel, or concrete—they all suffered damage.

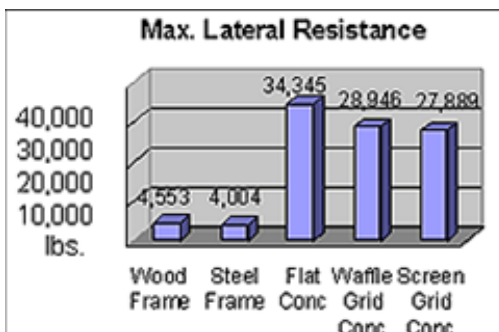
### Wood-frame houses with weak connections between the walls and foundation:

Wood-framed buildings are inherently ductile (flexible), which is an attribute during an earthquake. However, the shaking sent some of these houses sliding to one side. Frequently, the shear walls were strong enough, but the connection to the foundation was a weak point that gave way.



### Un-reinforced masonry or concrete buildings:

Masonry or concrete walls not reinforced with steel bars were not ductile enough to be effective shear walls. And if there is no steel connecting them to their foundation, the joint between walls and foundation can be a weak point.



## Why reinforced concrete is safe

Reinforced concrete walls are a composite system: Concrete resists compression forces, and reinforcing steel resists tensile forces produced by an earthquake.

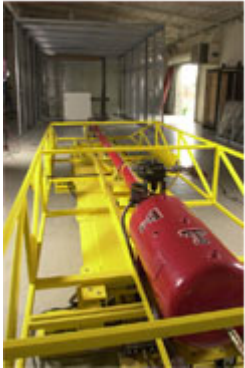
The concrete is cast around the bars, locking them into place. The exceptional ductility of the steel to resist tensile forces, coupled with the rock-like ability of concrete to resist compression, results in an excellent combination of the three most important earthquake resistance properties: stiffness, strength, and ductility. A study at Construction Technology Laboratories revealed that even a lightly reinforced concrete shear wall has over six times the racking load resistance as framed wall construction.

It's no wonder that modern reinforced concrete buildings were found to survive these recent earthquakes with rarely any significant damage.



Texas Tech University

# Flying Debris Tests



The **Wind Engineering Research Center** at Texas Tech University in Lubbock, Texas, tested 6-inch insulating concrete walls and several other wall systems to determine their **resistance to flying debris during a tornado or hurricane**. The tests were performed using a compressed air cannon to propel a 15-pound 2x4 wood stud (missile) at over 100 miles an hour at the test walls. (It should be noted that the standard tests for building materials used in hurricane regions is a nine (9) pound object traveling at only 34mph!)

**The 6-inch insulating concrete wall performed with flying colors while the wood frame and steel frame walls failed miserably, even when covered with brick.**

Wall Type	Test Wall Specs	Debris Speed	Results
ICF	The 4' x 4'6" insulating concrete wall test panel was filled with 3000 psi concrete and a #4 rebar at 24" o.c. vertically and #4 rebar at top and bottom horizontally. A 1/4" thick EIFS stucco was applied directly to the wall.	15lb wood stud fired at 103.8 mph	The wood stud broke and splinted into pieces after penetrating the foam but did no observable damage to the concrete in the insulating concrete wall.
Wood	A 2 x 4 wood frame wall with 3/4-inch plywood sheathing and a 4-inch brick veneer	15lb wood stud fired at 69.4 mph	Even at this slower speed, the wood stud perforated through the entire wall with little damage to the wood stud (missile).
Steel	2 x 4 steel frame wall covered with 1-inch of foam insulation and an EIFS stucco system	15lb wood stud fired at 50.9 mph	Went through the wall completely with no damage to the wood stud.

Insulating Concrete Form structures are

# Durable



**History attests to the permanence of concrete.** The cementitious structures of ancient times are comprised of only a crude form of the highly refined concrete we have today, yet they've stood the test of time.

The high-mass walls of an insulating concrete form structure give it a remarkably solid feel. And make it a remarkably solid investment, too. While wood structures are expected to last decades, it only makes sense that a building made from steel reinforced concrete and high-density foam will last centuries.

The permanence of concrete construction **increases the value of your investment**, whether it be your personal residence, a multi-family dwelling, or a commercial structure. When you build with concrete, you build for keeps.

**Neither polystyrene nor concrete will ever rot or rust.** Reinforcing steel, buried deep inside and protected by concrete's alkalinity, does not corrode.

After years of service, an ICF structure can be completely refurbished with new interior and exterior finishes to achieve an updated style or new use.



Insulating Concrete Forms are

# Adaptable



**ICFs are extremely adaptable to your design, making them an architect's dream!**

An ICF house can look just like a traditional home if you want. Or, because of the innate flexibility of the foam material, you can have unique footprints, arches, angles and curves as part of your design at a lower construction cost than with traditional building methods.

ICF homes can be designed in any style, and will accept any traditional exterior finish including vinyl or wood siding, stucco and brick.



Insulating Concrete Forms are

# Earth-Friendly



**Green.** It seems to be the new buzzword in the construction industry. And with good reason. The construction practices of the past are simply unsatisfactory for the world of today - and tomorrow.

It's more important than ever that we conserve natural resources and reduce waste and pollution. There are countless reasons why we should do every we can to protect the environment.

ICFs not only offer the owners and tenants unbeatable benefits, but they're also **environmentally responsible**.

- Building an ICF home instead of traditional stick frame home **saves at least 10 trees**.
- The enormous reduction in energy use — up to 70% — **saves our natural resources**.
- The energy savings also result in **less carbon monoxide** being released into the atmosphere on an ongoing basis.
- ICF blocks — especially BuildBlock ICFs — result in **less construction waste**.
- BuildBlock ICFs contain **no** HCFC, formaldehyde, asbestos, or fiberglass, and no harmful CFCs (chlorofluorocarbons) are used in their manufacture, nor is there any degree of "off-gassing."



