



RESIDENTIAL TECHNOLOGY *Brief*

CONCRETE HOMES SAVE ENERGY

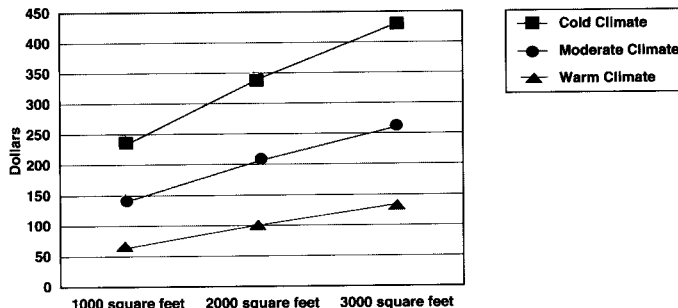
Building a concrete home with insulating concrete forms (ICFs) saves energy and money. The greater insulation, tighter construction, and temperature-smoothing mass of the walls conserve heating and cooling energy much better than conventional wood-frame walls. This reduces monthly fuel bills. It also allows use of smaller heating and cooling equipment, saving money in construction.

Houses built with ICF exterior walls require an estimated 44% less energy to heat and 32% less energy to cool than comparable frame houses. A typical 2000 square foot home in the center of the U.S. will save approximately \$200 in heating costs each year and \$65 in air conditioning each year.

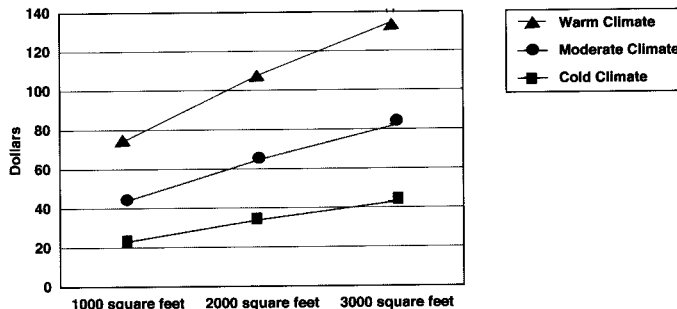
The bigger the house the bigger the savings. In colder areas of the U.S. and Canada, heating savings will be more and cooling savings less. In hotter areas, heating savings will be less and cooling savings more.

How much will I save?

Estimated Annual Heating Savings



Estimated Annual Cooling Savings



The smaller heating and cooling equipment needed for such an energy-efficient house can cut construction costs by an estimated \$500 to \$2000. The biggest equipment savings come with the houses that have the most energy savings.

How do we know all this?

The energy savings estimates come from a study of single-family houses spread across the U.S. and Canada. Researchers gathered data on 58 houses in all. Half had exterior walls constructed with concrete using ICFs made of expanded polystyrene (EPS) or extruded polystyrene (XPS) foam.



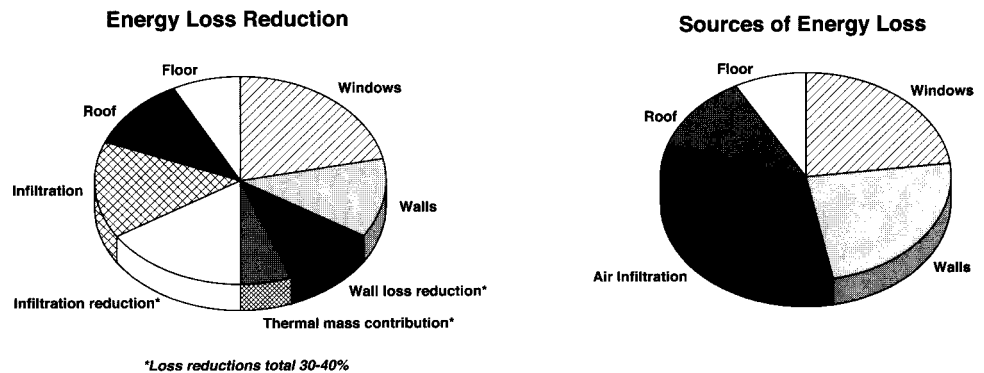
The other half were neighboring houses with walls constructed of wood frame. All houses were relatively new (less than 6 years old) and built with modern methods.

The researchers compared the energy bill of each concrete house to its frame counterpart, carefully correcting for important differences to get an "apples-to-apples" comparison.

Estimates of equipment savings are actual numbers reported by contractors that build ICF houses.

Where do the savings come from?

Insulating values for ICF walls using polystyrene foam are R-17 to R-26, 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. And ICF walls are tighter. In tests, ICF houses averaged about 1/2 as much infiltration (air leakage) as frame.



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. The walls themselves "add back" heat or cooling to the house when it needs them most. This contributes about 6% of the needed energy to the house for free.

Reduced equipment costs result from the energy savings. Since the energy needed is less, the furnaces and compressors that heat and cool can be smaller. And the more the energy savings, the greater the possible reduction in equipment size—and the equipment cost.

What's the bottom line?

In planning a new house you can estimate that building the walls of concrete using ICFs will save you hundreds of dollars per year in energy costs. As shown in the graphs, the savings are greater the bigger the house. Heating savings are highest in cold climates, and cooling savings highest in warm climates.

You may also save hundreds or thousands of dollars in construction costs for heating and cooling equipment. Talk with an ICF homebuilder for estimates.

More Information?

Concrete Homes:
Hotline
1.888.333.4840
Online
www.concretehomes.com

The following publication is available from the Portland Cement Association.

To order call Customer Service at 1.800.868.6733

RP119 VanderWeir \$10.00
"Energy Comparisons of Concrete Homes Versus Wood Frame Homes"

Reports on the findings of research comparing the energy use of 29 homes built with Insulating Concrete Forms, and 29 wood frame homes. Homes were compared across the U.S. and Canada.