Your New ICF Home Won’t Guarantee Low Utility Bills, But EnergyWise Will

A “Systems Approach” Can Maximize Energy Savings and Provide Many Other Tangible, Healthy Benefits

The market is red-hot for foam insulated homes and likely to gain even more steam as energy prices continue to escalate with no end in sight. Many ICF manufacturers have reported a tremendous increase in sales for new single-family homes built in 2007. These trends are expected to increase as utility prices skyrocket out of sight.

Certainly, one of the main reasons for this growth is the superior energy efficiency of foam homes when compared with typically insulated wood-frame construction. Building homes using ICF’s and spray-on foam insulation can potentially save hundreds of dollars annually in heating and cooling expenses. However, constructing an energy-efficient thermal envelope does not always guarantee rock-bottom utility costs, contends Richard Rue of EnergyWise Structures, McKinney, Texas.

"It is sad how many frustrated people we talk to who are not getting the energy savings they expected. They contact us and say: 'I spent all that extra money to build a foam insulated home, because I thought it would be the panacea pill and automatically ensure low utility bills.' Unfortunately, they only have part of the picture," says Rue. "One of our dealers sprayed a 4,000 square foot bank building a few months back. The builder decided not to take our dealer's advice on engineering the HVAC system, because he indicated that he had built this type of structure many times in the past with conventional insulation. His HVAC contractor installed fifteen tons of air in the bank building, and the result was a structure in which they cannot get the relative humidity below 73%.” This is an example of why Rue stresses the importance of taking a “systems approach” when designing and building a foam insulated structure (see Rue’s other strategies for achieving optimum energy savings). As part of a systems, or whole-house, approach, the HVAC system is engineered to work in harmony with the structure’s thermal envelope and local climate conditions. This can assure the homeowner of three important benefits:

• A well-designed HVAC system that will heat and cool efficiently, even during temperature extremes.

• Comfortable humidity levels in the home and a healthier living environment.

• An ultra-energy-efficient structure.

According to Rue, “The ‘systems approach’ starts with proper engineering of the entire package: the mechanical systems, doors and windows, the insulation, and caulking to prevent air infiltration. If you take the ‘systems approach’ to building an ICF home, you can put your thermostat at virtually any temperature, and once the temperature and humidity stabilizes, it will take very little energy to maintain it.”

Common mistakes affecting energy savings

Properly engineered ICF homes are inherently energy efficient allowing owners to easily use smaller-capacity heating and cooling equipment. However, many HVAC contractors are unfamiliar with the superior thermal qualities of foam homes and therefore end up installing oversized equipment or poorly-designed duct systems. This results in higher equipment pricing as well as higher operating costs.

Another common mistake is to mix and match heating and cooling equipment, using components made by different manufacturers. Like a precision-engineered automobile, the HVAC system will operate much more efficiently if all the equipment is compatible. Variable-speed systems also deliver better energy performance than single-speed equipment, because they automatically adjust the flow of heated or cooled air to the desired comfort level. These systems will typically run longer, but at lower speeds, providing better humidity control while reducing operating costs.

Rue frequently encounters the common mistake of installing air-to-air heat exchangers in ICF homes, based on the flawed thinking that since foam homes are more...
improve the indoor air quality," he ex-
damper that brings in outside air to
unacceptable level, the sensor will
system, if the air quality reaches an
tors the air quality of the home.
"ventilation on demand" system — a
Rue recommends the installation of a
monoxide levels. For peace of mind,
mit the buildup of dangerous carbon
homes are too air-tight and will per-
are sometimes concerned that their
any air exhausted through bathroom
through windows alone to make up for
wall ratio. There is enough leakage
at least a 10% to 30% window-to-
airtight, the average house will have
Although foam homes may be more
bring in additional outside moisture
mid or polluted climates, you are just
bring in 'fresh'
air, but they are also bringing in
exchangers claim they bring in 'fresh'
provide assurance that you have high-
quality air in the house.
“Ventilation on demand” also eli-
minates the need for a separate
system to continually bring in outside
air. “Manufacturers of air-to-air heat
exchangers claim they bring in ‘fresh’
air, but they are also bringing in
humidity and pollution,” notes Rue.
“Therefore, you are better off spend-
ing your money on a good air-filtra-
tion system."
Choosing the correct method to
properly insulate the attic with foam
insulation is another key factor in
the energy performance of an ICF
home—and in reducing the over-
all operating costs of HVAC equip-
ment. Unfortunately, most builders
subscribe to the “R-value myth” and
do not always make the best choice,
says Rue. Comparing the R-values,
which are determined under labora-
tory conditions, can be deceiving, he
explains. “It is a very inexpensive sys-
tem (the cost is about $400) that pro-
vides assurance that you have high-
quality air in the house.”
With the ‘ventilation on demand”
system, if the air quality reaches an
unacceptable level, the sensor will
send a signal to open up a motorized
damper that brings in outside air to
improve the indoor air quality," he ex-
plains. “It is a very inexpensive sys-
Using the “systems approach”
to building an ICF home allows
you to put your thermostat at
virtually any setting, and once
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energy to maintain it.

On the left, is a home built in 2006, conventionally insulated and highly “EnergyStar”
rated. Notice the snow on the roof of the EnergyWise engineered SIP/ICF house in the
middle — further evidence of foam’s superior energy efficiencies. On the right, is an ineffi-
cient older home. All these homes are located in the historic district of McKinney, Texas.
This 2,542 square foot EnergyWise engineered SIP/ICF home is GUARANTEED not to
exceed $38 per month for the heating, cooling and hot water bills.

**The symptoms of improperly sized HVAC systems**

If you are living in a foam home and
are not enjoying the lower utility bills
you expected, chances are the prob-
lem originates with poor engineering
of the HVAC system. The following
are some symptoms of an improper-
lized system and what they might
mean.

1. **Short-cycling.**
   One of the easiest symptoms to
   recognize is short-cycling of the cen-
   tral air conditioner. If the unit is turn-
   ing on and off four to five times per
   hour in the heat of summer, it is not
   operating efficiently. Instead, the unit
   should run continuously for 40 to 50
   minutes out of every hour to maintain
   consistent room temperatures and to
   achieve more comfortable humidity
   levels. “What most homeowners do
   not realize is that when the AC unit
   first turns on, it goes through a start-
   up process that will make the unit
   very inefficient,” says Rue. “If a unit
   short-cycles four times an hour, it is
   using as much energy as if it were
   running for two hours continuously.”
   The problem is usually due to oversiz-
ing. A 2,000 square-foot EnergyWise-
certified foam insulated house
located in a Sun Belt state may need
only 1-1/2 tons of cooling capacity,
compared with 4 tons for a conven-
tionally insulated wood-frame struc-
ture.

2. **Uncomfortable humidity levels.**
   One of the consequences of short-
cycling is uncomfortable humidity
levels which compound the problem
by compelling homeowners to turn
the thermostat even lower, because
they feel clammy. “In an ICF house
that is properly engineered, you will
feel cool even when the thermostat is
set as high as 76 degrees, because
the humidity levels are low. The house
should not be above 50% humidity in
the summer,” says Rue. Too much
humidity can also be caused by the
use of an air-to-air heat exchanger,
which may be ushering in moist out-
side air. The simple solution is to turn

continued on next page
it off, says Rue.

3. Mold, mildew, and warping.

In addition to making homes uncomfortable, high humidity can encourage the growth of mold and mildew. You may notice mold growth in bathrooms and on interior walls or ceilings. Another sign of too much humidity is warping of wood floors and wood-framed windows.

4. A home that is too dry.

Over-sizing of the furnace is just as bad as over-sizing of the AC system. “More is not better, even though a mechanical contractor might tell you so. You end up drying out the house to the point that interior caulking will actually crack and peel. The humidity level should not drop below 30%,” says Rue. Static electricity is another sure sign that the humidity level is too low. Rue recommends buying an inexpensive desktop humidistat to monitor humidity readings year-round.

Who to turn to for help

Whether you are a builder or homeowner, you should always seek the services of a mechanical engineer or licensed HVAC professional that specializes in foam-insulated structures when sizing and designing the duct layout for the heating and cooling system. It is important to select a professional who will take a whole-house approach, accounting for such factors as the square footage of the space, insulation of the thermal envelope, the number of windows and doors, and the climate. EnergyWise, for example, uses a proprietary computer program generated from experience derived from NASA thermal consultants for the Mercury, Gemini and Apollo space programs to perform a detailed energy analysis of each house. Included are energy-consumption comparisons of different heating and cooling systems. It then matches the HVAC system to the thermal envelope, with consideration for healthy indoor air quality. Then, an EnergyWise engineer designs the HVAC duct system which is critical to proper air distribution. The company even offers a monthly average utility cost guarantee if the builder or homeowner follows the EnergyWise plan. Rue says that an EnergyWise-certified foam home will use less than a third of the energy for heating and cooling than a typically insulated structure constructed to current code.

“When you use a licensed mechanical engineer, you have someone to turn to who is responsible for the correct sizing and layout of the ducts for the HVAC system. The engineer should get involved from day one.”

How do you find a qualified mechanical engineer, particularly one that specializes in ICF/foam-insulated home systems? Rue recommends asking the manufacturer or distributor of the ICF products. “People who are selling you ultra-energy-efficient products should take responsibility for giving you the resources you need to achieve successful results,” he says.

You should also insist on an inspection of the home to ensure that the design and engineering are done properly. EnergyWise has developed procedures to videotape inspections of every job and plans to send copies to the homeowner and builder as a visual record.

“We can do all this – the engineering and inspection – for about 35 cents per square foot of heated and cooled area. If you are building a 3,000 square-foot house, you can get a mechanical system that is professionally designed, engineered and inspected – along with a guarantee of lower utility costs – for about $1050,” says Rue.

A wise investment indeed in this age of soaring energy costs!

About Richard Rue and Energy Efficient Construction Methods

Richard Rue, CEO of EnergyWise, is a recognized industry spokesman and mechanical/thermal consultant with over 30 years in HVAC, insulation, energy consumption and conservation. His time-tested expertise highlights the critical nature of properly engineering HVAC systems to avoid frequent post-construction problems and complaints.

From manufacturing to geo-thermal, laboratory testing to engineering over 40,000 structures, Mr. Rue has real-world performance statistics that support his assertions.

For more information, visit online at www.energywisefoam.com.