

START RIGHT

The ingredients
of an energy-
efficient house

By Arnie Katz

Getting an energy-efficient house is really a question of doing a few things very well: 1) build it tight; 2) insulate it right; 3) orient it for sunlight; 4) correctly install efficient equipment, and 5) install proper ventilation.

To build the house tight, you need a continuous, durable air barrier surrounding the living space. There are a number of ways to do this effectively, such as sealing the drywall, sealing a poly vapor barrier, caulking everything in sight, or using a house wrap product. Each of these can be effective if done correctly. Unfortunately, none of them are typically done correctly. House wraps as normally installed, for instance, are probably of little use.

Some of the tightest houses I've tested have been built by Habitat for Humanity. This is partly due to the care that Habitat volunteers take, and partly due to the simplicity of the houses. The more complicated a house becomes with dormers, cantilevered floors, knee walls, open-web floor trusses, split-levels, and chimneys, the more difficult it is to create a continuous air barrier around the living space. Careful attention to details becomes the key. And the only practical way to know whether the detailing has been successful is to test the house with a blower door. I am skeptical of a builder who claims to build energy-efficient houses but doesn't have them tested.

Insulating the house right would seem to be as easy as pulling on your longjohns. Certainly, the level of knowledge about insulation has increased dramatically since the 1970s, and building codes have improved. Unfortunately, most insulation jobs I see include lots of compression, voids and gaps. Insulating houses has become a highly competitive, low-bid-driven industry in which the contractors who price their work based on doing a quality job usually get rewarded by not getting the work.

Unlike the tile floors, the whirlpool tub, or the fireplace, the insulation job is invisible to the buyer, and therefore is often approached in terms of the minimum job necessary to pass inspection. Many building inspectors don't have the time to do a really thorough job or the training to understand the importance of the small details. Beware of a builder who claims to build "energy efficient" houses who doesn't mention that he or she routinely pays extra to get the highest quality insulation job.


The third key to getting a comfortable house with low energy bills is to orient the house to capture a lot of sunlight in the winter and very little in the summer, and to take advantage of prevailing breezes. Put most of the windows on the south side, ideally with overhangs big enough to block the summer sun. Put few windows on the east and west sides, so that the low morning and afternoon summer sun won't enter the house.

Fourth, select high efficiency equipment that is installed correctly. A study of heat pumps and air conditioners by Advanced Energy found that 85 percent of the units had either too much or too little refrigerant. Other typical problems include over-sizing, mis-matching of indoor and outdoor units, and improper installation of condensation lines. Typical duct systems have almost

seven times as much leakage as we consider reasonable. And equipment is often installed in such a way as to create negative pressures in the house which can cause furnaces, water heaters and fireplaces to backdraft poisonous combustion products into the living space.

A builder who talks about energy efficiency and just mentions a fuel type or a SEER rating probably doesn't understand how often proper installation doesn't happen, which probably means he's not paying enough to make sure it's done right. Beware!

Finally, it's crucial that all this happen in a house with adequate ventilation to control moisture and assure fresh air for people. No one wants to live in an energy-efficient thermos bottle. Adequate ventilation has to be planned and controlled. At the very least, a house should have bathroom and kitchen exhaust fans that exhaust all the way to the outside, and some system for bringing some outside air into the house.

Sloppy construction in the name of letting the house "breathe" simply won't cut it. 

Arnie Katz is director of training and senior building science consultant with Advanced Energy in Raleigh. Formed in 1980, Advanced Energy is a nonprofit corporation that focuses on industrial process technologies, motors and drives testing, and applied building science. Its mission is to create economic, environmental and societal benefits through innovative and market-based approaches to energy issues. North Carolina's Touchstone Energy cooperatives are one of Advanced Energy's sponsors. For more information, visit www.advancedenergy.org



Greg Brooks, Walton EMC

Insist that your builder uses the highest quality insulation.