

Building Better Homes
Research Paper

By Cole Butler

Sustainability and the Built Environment
University of California
Davis Extension

Instructor, Dr. Jeff Loux
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What are the challenges of building homes in 2006? Listed below are a few of the leading challenges for residential structures as presented by Building Knowledge Inc.

1. Home builders are experiencing more comfort and moisture-related callbacks, higher warranty costs and more expensive litigation.
2. The industry is also seeing higher insurance premiums, policy exclusions for moisture-related damage claims and fewer insurers providing home builder insurance policies.
3. Many builders struggle with finding adequately trained and experienced trades people and subcontractors.
4. There's also a constant influx of new building products and materials today that may or may not work properly in the homes we build.
5. Higher energy efficiency standards and consumer expectations for comfort and lower utility bills have resulted in the construction of tighter homes
6. Without proper ventilation, these tighter homes can accumulate moisture and pollutants.
7. A market driven desire for more complex home design has created more opportunities for performance problems.

As the formal studies of building sciences are increasing in university programs internationally, I find it useful to study how buildings fail. The construction methodologies and materials we use to design with today can provide endless solutions for good design. But is it good design when the buildings do not out live the 30 year mortgage? One element of high performance building is the durability of the products and the assembly methodologies.

To help manage the challenges mentioned above, the house needs to be thought of as an integrated system where the building and the equipment, the lifestyle of the occupants and the surrounding environment work together as a whole. The whole house systems approach means that all the participants in the building process, from the architects, contractors and trades people work together as a team rather than independently. These ideas are reinforced through the US Green Building Council (USGBC) and other national and leading green building programs. The team players need to be aware of how their choices and workmanship impact the performance, quality, livability and durability of the home. A goal of the whole building systems approach is to design and build homes that, with proper care and maintenance, will last for more than 100 years. These sustainably designed homes are safer, healthier, energy efficient, more durable and more affordable to own and maintain.

As a tool for building owners and occupants to know more about the questions to ask, I have made available a series of summaries and checklists. These are created by Building Knowledge Incorporated. The areas of the building are separated into the following sections. They are digitally available as pdf files attached to this research paper.

1. The Building Site
2. The Foundation
3. The Subfloor System
4. The Exterior Wall System
5. The Roof
6. Plumbing & Electrical
7. Mechanical Systems
8. Finishes & Appliances

The summary sheets provide a highlight for areas to consider when reviewing and designing for each of the topics. Many of the sections will refer to specific construction terminology that one will need to become familiar with. For people using these documents that are not in the construction industry, they can achieve a great deal by asking questions about these basic principles.

As a reminder in all of the areas of the building, the building science principles and practices apply to new construction and remodeling; water and physics do not have a prejudice where they are. They will continue to behave the same.

The following are eight rules of building performance that are key to better buildings. The rules are provided by Building Knowledge Inc. For those not versed in construction you are safe. These are principles are simply about physics.

1. **Heat flows from warm to cold.** All faces of the building envelope must be air sealed and properly insulated, including walls, roof or ceiling, foundation walls and floor slabs. And select high quality energy efficient windows.
2. **Moisture moves from warm to cold.** Select materials and wall systems appropriate to your climate that will resist the flow of water vapor through the building envelope, and reduce the potential for condensation within wall cavities.
3. **Moisture moves from more to less.** As in rule2, select materials and wall systems appropriate to your climate that will control the flow of

- moisture through the building envelope, and properly seal all penetrations and openings.
4. **Air out equals air in.** Select sealed combustion appliances and remember to provide controlled-source make up air for large exhausting appliances.
 5. **Air behaves like a fluid.** Seal all ducts, supplies and returns, avoid putting ductwork in non-conditioned spaces and use sealed ducted returns.
 6. **Rain follows gravity.** Slope the grade away from the foundation, install gutters and extended downspouts and properly install a water management system to drain the roof, drain the walls and drain the foundation.
 7. **Everything gets wet, let it dry.** Keep siding or cladding out of the dirt and off the roof. And when it does get wet, and it will, provide a means for it to dry.
 8. **It all happens at the surfaces and the connections.** This means when the different components come together make sure they are compatible with each other and their environment, make sure they are counter flashed when necessary and make sure they can be easily maintained.

In summary, when we build thinking about how our decisions in construction effect the environment, we may better be motivated to create a place that becomes improved by having a building as a part of the whole earth system. Our life itself is the results of all our efforts hinging on the quality of our intentions. When we contemplate the imponderable and rejoice in participation with the planet rather than conquest, creative efforts become a service to others.