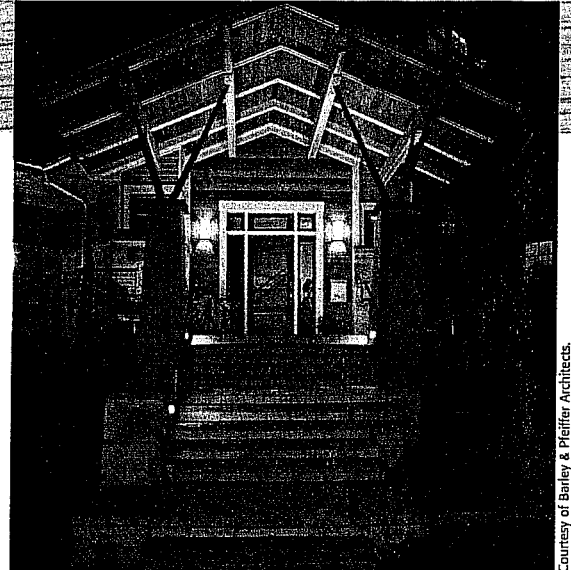




Green Design Strategies



Courtesy of Barley & Pfeiffer Architects.

Before you simply upgrade the insulation in your current designs and call them green, take a close look at the homes you've already built. The lessons on how to best improve your building methods can be found in the homes you've already built, says Architect Peter Pfeiffer, a partner in Barley & Pfeiffer Architects (Austin, TX) and one of the leading specialists in sustainable design.

HOME AS A SYSTEM

"Don't assume just because you haven't gotten any callbacks that there haven't been any problems," he says. Call it the law of unintended consequences, but our various home systems (HVAC, lighting, plumbing) are often fighting each other, expending huge amounts of energy and adversely affecting indoor air quality in the process.

"A house is a system. Often one component—such as a power attic fan—can affect another seemingly unrelated feature, such as mold growth under a bathroom vanity."

This concept of building science is unfamiliar to many builders who came of age during the boom when massive square footage was king. Here are Pfeiffer's tips for builders looking to change that.

● 90-10 Rule

Don't rush the design process. "A full 90% of opportunities to achieve a high-performance or green home come in the first 10% of the design process," says Pfeiffer.

● Four Core Failures

The primary culprits of poor energy efficiency in most of today's new home construction are infiltration of outside air, improper orientation, excessive solar heat gain and (to a lesser extent) appliances and light fixtures.

● Passive Solar 101

Passive solar orientation involves placing the home with the long sides facing south and north to minimize summer solar gain and allow for some winter solar heat gain. Orient streets in a new subdivision to run from east to west as much as possible. Take advantage of prevailing breezes

during different times of the year. Refer to the NOAA website (noaa.gov) for climate information.

● Climate Specific

Every region should employ different sustainable design strategies that reflect the region's climate, material availability and building practices.

● Don't Design By Building Code

Don't default your design to the building code and think it's good enough—it's not. For example, even though many building codes specify a ventilated attic in humid climates, this configuration allows humidity to infiltrate living spaces below and can damage insulation. Sealing the attic and ventilating a continuous air space immediately below the roof decking (not the attic) is a better configuration.

● Use Awnings, Porches, Eaves

These act as a buffer against the summer sun while protecting windows, doors and exterior walls from the elements. For roof overhang and window sizing, use the Sun Angle Calculator from Ball State University at sbse.org/resources/sac.

● Protect Against Infiltration

Thirty-pound ASTM building felt in conjunction with commercial-grade building wrap that is well taped makes for a good weather barrier system. "You want to create a raincoat underneath the wall cladding because all siding and cladding leaks eventually," says Pfeiffer.

● Humidity & Wall Strategies

Keep humidity from infiltrating the wall cavity by installing a vapor barrier on the warm (or more humid) side of the wall. In the North, this is the inside surface. In the South, this is the outside surface of exterior walls.

● HVAC Strategies

With proper windows and shading, most homes should require no more than 1 ton of cooling capacity for every 650 sq.ft. of living area; 850–1,000 sq.ft. per ton should be the goal of a well-designed home. Only use sealed ducts to move conditioned air. Leaky ducts rob energy efficiency and can cause depressurization of a home, bring-

ing in outside air and humidity, which can cause mold growth. Ducts with a slick interior surface—such as metal—are best for delivering clean air and staying clean. Unlined return air wall chases are not effective nor are open return air plenums above dropped ceilings and using floor joist cavities.

● Improving Exteriors

Make sure all flashing is installed shingle style, meaning that the upper piece overlaps the lower piece. Employ a water table, a band at the base of the building that sheds water and prevents capillary absorption of water into the framing or sheathing at the base of the building.

● Choose Insulation Carefully

Fiberglass batt insulation is the norm for many builders—but you may want to upgrade to spray polyurethane foam insulation, which stops water vapor. Wet-blown, borate-based cellulose wall cavity insulation is also another good option (when used in conjunction with good air sealing practices) in reducing infiltration.

● Don't Vent Crawl Spaces

A vented crawl space can create more moisture and humidity problems than it solves. Pfeiffer doesn't recommend venting them unless there is a known source of ground water under the building that cannot be controlled otherwise.

● Passive Cooling Strategies

Proper orientation that minimizes exposure to the afternoon sun is key. Also, use a light-colored roofing material in most climates since dark roofs absorb non-beneficial heat. Shade all the east-, south- and especially west-facing windows from the spring, summer, and fall sun. Low-e windows are not a substitute for proper shading and solar control. A proper-size over-

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hang does a much more effective job.

A radiant barrier on the underside of the roof deck, such as LP's Tech Shield, will substantially reduce heat gain through the roof, reducing A/C bills and loads while enhancing occupant comfort. Radiant barriers do not lead to the deterioration of roof shingles, contrary to myth.

● **Lighting & Electrical Tips**

Proper day lighting, especially indirect daylight from high windows, can make for substantial energy savings and an enhanced indoor environment. Clerestory windows work well to naturally siphon heat out in the spring and fall. Avoid recessed cans—even the so-called "airtight" ones—that puncture the thermal envelope of the building. For the same reason, try to avoid light switches and electrical boxes on exterior walls.

Become familiar with the new types of fluorescent lamps, especially the thin T2, T5 and T8 types. The light quality is superior and you can get a wide range of color correctness. Fluorescents put out

very little heat and last much longer than incandescent and halogen lamps. Halogen lamps produce a lot of glare and heat that the air conditioner will have to fight.

● **Green Plumbing**

Water heater placement is important. Isolate gas units from the indoor air of the home and provide them with their own source of combustion air directly from the outside; sealed combustion units are ideal. Thoughtful placement, close to bathrooms and the kitchen, can also negate the need for energy-wasting circulating pumps and still ensure quick hot water to the points of first need in a home—usually the master bath.

Insulate all water lines, even the cold water line. Un-insulated cold water lines (including A/C system condensate lines) are susceptible to condensation forming on them, setting up conditions for mold growth and inviting insects into wall and ceiling cavities.

● **Healthy Indoor Air Strategies**

Use low-VOC (volatile organic compounds) latex paints on the interior. Before install-

ing carpeting, unroll it outside a day or two so it can let off gas. Install outside venting exhaust fans in all bathrooms, kitchens and other rooms where there may be a lot of internal moisture generation—but be careful not to draw so much air out that you create a negative pressure. Timer switches on these fans are preferable, since they are quiet, reasonably priced and last longer than the windup timers.

Avoid chemical treatments for termites since they only last about five years, lead to occupant health problems and pollute ground water. Use a permanent physical barrier, such as Termi Mesh, instead. It costs about 50% more than chemical treatments, but is permanent.

● **Be Creative, Have Fun**

Finally, this is far from a comprehensive list of options and Pfeiffer says not to use all his suggestions verbatim. Instead, investigate locally appropriate strategies and use your creativity. The fun thing about green building is its flexibility, Pfeiffer says. ●