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Greening a Home

PHOTOS BY PHILIP WEGENER PHOTOGRAPHY & VIDEO

If you're building or remodeling a house to be more energy efficient, consider these things during the planning stages.

BY MARK COLLINS

Talk to an architect who specializes in green building and you'll soon hear many of the current catchwords, phrases and acronyms: energy efficiency, resource conservation, HERS rating, low- and no-VOCs, LEDs, CFLs, solar electricity and the like.

Scott Rodwin is fluent in green-building jargon. He can talk about polyisocyanurate insulation and low-embodied energy materials with the kind of ease most of us only capture when we order lunch.

But for Rodwin, who's been in the green-building industry since 1990 and has designed and built green homes

here for the past 13 years, success isn't simply measured in how close he can get a new home to net-zero energy usage. The key to a successful project is to design and build a green home that makes the homeowner happy.

"A home that people love is a home people will take care of," Rodwin says. "And that's probably the magic ingredient of sustainability—people loving their homes."

The owners of a recent Rodwin project love their new digs. The 4,118-square-foot single-family home, built by Rodwin Architecture and Sky-castle Homes Design/Build (Rodwin

is president of both firms), is in north Boulder's foothills. Completed last summer, the three-bedroom, two-and-three-quarter-bath home features magnificent vaulted ceilings that invite sunlight into its comfortable rooms. It nestles into a wooded hillside and sports handsome stone and stucco exteriors, and state-of-the-art green mechanical systems and materials.

"The design is clean and contemporary-feeling, but all the wood makes it warm," say the homeowners, who asked to remain anonymous. "One guest said he thought it was a perfect house. We agree."

All appliances are Energy-Star rated, and 95 percent of the home's lighting is LEDs and CFLs. The cherry kitchen cabinets are finished with a low-VOC sealer, and the wood floors use a low-VOC oil and wax finish.

Perhaps most remarkable, the home earned a Home Energy Rating System (HERS) of 22 after the design-build team completed construction. The Boulder County Building Code, one of the country's strictest, Rodwin says, required the home to have a HERS of 45, based on its square footage. That means the county required the home to consume 55 percent less energy than the National Building Code allows for a home of that size. With a HERS of 22, the home uses 78 percent less energy than the maximum allowed by the National Building Code. "So in terms of consumption, the home uses considerably less energy than both the national and county codes require," Rodwin notes.

Not starting with an energy-reduction goal at the beginning of the process is a mistake people often make when they try to incorporate sustainable features into a new home. As an example, Rodwin cites



taking advantage of the sun's energy from a design standpoint.

"You can decrease your energy bills by up to 50 percent with good passive-solar design," he says. "If someone buys a house plan and then tries to make it green after the fact—for example, putting solar panels on the house—that

costs money. A solar array often costs between \$10,000 and \$20,000. That's a good way to green a house, but it's not the most cost-effective way. Passive solar can decrease your energy costs by the same amount—and it's free."

Good passive-solar design includes running the long axis of the house east

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Top: The home in Boulder's foothills incorporates fire-resistant materials and techniques, such as cementitious stucco, stone wainscot, metal roofs, ipe decking with metal railings, gravel where the house meets the land, and ignition-resistant landscaping.

Bottom: Along with all the other rooms, the dining room feature excellent natural daylighting and natural cross-ventilation.

to west and putting a majority of windows on the south side to take advantage of Colorado's sunlight. Another component is protecting those windows with proper-sized overhangs and using high-thermal-mass materials, like concrete or tile floors, to retain the heat in south-facing rooms.

"The last part is protection against overheating in the late afternoon. That's a big one," Rodwin says. "Here in Colorado, we have a lot of views to the west. The late-afternoon sun falls low in the sky, so it gets under the overhangs. A lot of houses that have big views to the west tend to overheat in the afternoon, triggering the need for air conditioning. The easiest way to prevent that overheating is to minimize western windows or add a deep porch on the west side."

The owners of the house in north Boulder say their energy bills are minimal due to the home's energy systems. "We were interested in building as green a house as we could afford, without compromising our space requirements," they say. "We're happy with the result. Our geothermal heating and cooling system is efficient and, when combined with the photovoltaic system, has yielded very low energy bills."

Because of the home's location, fire-mitigation elements were key in its design. Construction on the property had begun when the Fourmile Fire devastated more than 160 homes in the mountains above Boulder in September 2010. "The fire came within a mile of the house, which we intentionally designed to be a fire-resistant house," Rodwin notes.

That design includes simple roof forms to eliminate unwanted collections of leaves and twigs that tend to gather in nooks and crannies of a complex roof—the kind of materials that become kindling for a hungry forest fire. Metal roofs, stone patios, and stucco and stone siding were used instead of wood alternatives.

Contractors removed trees in the immediate vicinity of the house as well, and created a 3-foot gravel barrier around the entire perimeter where the house meets the land.

The Price of Going Green

Rodwin and his staff have taught a class on green building through the city and the Colorado Green Building Guild for the past six years. Last year, they began teaching a class that helps people navigate the city and county's building codes as well. The most common question he

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Right: The bathroom features a frameless corner window, and low-flow WaterSense fixtures throughout the house minimize both water use and the energy required to heat water.

Below: A xeric Japanese garden features local flagstone and moss rock. The plants are fed by a copper rain chain that captures water from the roof.



of green building. You can focus too much, for example, on energy performance and end up with a house that performs exceedingly well on energy performance, but is not attractive. Or it performs very well, but you had to spend a ridiculous amount of money for it to do that. Or you can build a house that has all natural materials, but may not perform well from an energy perspective.

"So a truly green house includes a balanced spectrum from these three categories: energy efficiency, environmental quality (indoor air quality) and resource conservation. A truly green house successfully performs in all three categories."

The north Boulder foothills home, for instance, has excellent indoor air quality. To achieve that, the team used paints, caulks and adhesives with low amounts of volatile organic compounds (VOCs), along with natural wool carpeting.

If you're considering remodeling an existing home with sustainable methods and materials, here are a few easy guidelines to follow: Consider upgrading fiberglass insulation with foam or cellulose insulation. Make sure you use as much reclaimed or recycled materials in the construction as possible,

and opt for less-toxic, no- or low-VOC materials. Use energy-efficient lighting (CFLs and/or LEDs) and upgrade the mechanical systems to sealed-combustion types.

In addition, Rodwin suggests taking care to choose windows with the proper solar-heat-gain coefficient (SHGC). A higher SHGC-rated window accepts more of the sun's energy and may be better suited for south-facing windows. Conversely, lower SHGC-rated windows would be better for western-facing windows.

And visit energysmartyes.com, Rodwin suggests. It's an easy-to-use and inexpensive resource offered by the county for people wanting to green an existing home.

Above all, make sure you create a space where you want to be, like the north Boulder couple did. "That house did really well in terms of the green-building perspective," Rodwin says, "but what we're striving for is a balance between making the house functional, beautiful, budget-conscious and as green as it can be."

"The ultimate test of whether or not a project is successful is whether or not the homeowners are happy at the end of it." 🏠

encounters in these classes is about the cost of green versus conventional building. His answer is always the same: It typically costs between 1 and 20 percent more to build green.

Looking further into the details, he says to create a home that is HERS 60, which means it uses 40 percent less energy than current codes allow, can be done for only about 1 or 2 percent more than to build conventionally. "If you start with the intent to build green, the cost is smaller than if you add it on at the end," he emphasizes.

A good green build isn't all about energy consumption, he adds. "It's important to balance all the aspects



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