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BUILDING GREEN

PINNACLE MOUNTAIN HOMES FINDS EFFICIENCY EQUALS GREEN

I T SEEMED ONLY NATURAL that builder Chris Renner of Pinnacle Mountain Homes would be inclined to jump on the opposition's bandwagon regarding the new Sustainability Code of "green building" standards that will go into effect in the Town of Breckenridge in January 2009. But after comparing the proposed code to his own home completed a few months earlier, Renner learned he not only exceeded the proposed standards, he ended up building one of the "greenest" and "smartest" homes to have been erected in Summit County.

"As I researched how our current building practices compared with 'built green' recommendations, I realized every home we built was about 20 percent more efficient on average, which means 20 percent less in energy bills," Renner says. "By modifying just a few areas, we could easily double or even triple that efficiency for a client."

"I think he's taken a leadership role," says Glen Morgan, chief building official for the town of Breckenridge. "A lot of builders build good, green houses, but he took a few more steps on his personal home. The solar panels were a big step. Chris reviewed the drafts...and assisted us in modeling the code."

Renner's primary goal was energy efficiency. "It's my Xcel energy bill," he notes. "I realized that what I was doing in the name of efficiency—creating a tight envelope and using top-of-the-line insulation and windows—was essentially the same thing others were doing in the name

of being 'green.' That really led us to be very open-minded and excited about adopting new things."

One important shift in the company is the focus on making the home airtight. This entails every aspect of the thermal envelope from insulating foundation walls and slabs to sealing all wall penetrations. The additional cost can be as little as a few hundred dollars in labor to seal all penetrations, or as much as \$5,000-\$30,000 for an upgraded insulation package on a house.

"The question one must always ask is how many dollars do you have to spend, and where do you want to spend them?" Renner says. "Figure out what you can afford, and then consider some options."

Rebate programs through Xcel and the state of Colorado made solar an attractive option for Renner. An average home consumes around 10 kilowatts a day and photovoltaic systems typically run \$8 to \$12 a watt to install. So the cost to provide a system capable of satisfying 100 percent of the energy needs of an average home would amount to about \$80,000-\$120,000. But Xcel provides a rebate of \$4.50 a watt, which knocks the installed cost down to as little as \$3.50 a watt—or as little as \$35,000 for a 10kW system.

Fortunately, photovoltaic systems can be designed at any size. Renner had room for a 4.6kW system on the roof, which ended up costing around \$18,000 after rebates and credits. Not only does Renner now have a guaranteed rate for his electric bill, he should see a payback on his investment in as little as a few years.

Active Energies, Inc. of Edwards, an energy consulting company, helped Renner select the best system to accomplish his goal. "It was great working with Chris because he could understand the reasoning behind our decisions regarding design and implementation," says Active Energies' Vice President Jason Weingast. "That really made a difference."

In Renner's home, the ventilation is controlled through a Heat Recovery Ventilator or HRV. In layman's terms, it exchanges the stale, heated air inside the home for cold fresh air from the outdoors. In the course of doing so, the heat from the air being released is transferred to the fresh air coming in. Exchanges can take place on a single floor or throughout an entire house. It's kind of like opening a window on a cold, winter day without losing any of the heat in the home. The end result is a lower heating bill.

Rick Veno, owner of Aspen Leaf Mechanical in Hudson, CO, used the Unico System for the ducts and transferring the heat, then he customized the system to adapt to below-zero outside air and extreme temperature differentials experienced at mountain elevations.

The engineering is a bit complicated, but crafty and efficient. Heat exchangers usually provide from 50 percent to 80 percent efficiency. If, for example, the inside air is 70 degrees





and it's a chilly 0 degrees outside, an 80 percent efficient heat exchanger will raise the temperature of the new fresh air to 56 degrees, saving heat that would otherwise be extracted. Renner modified his system with hot water coils that turn on automatically at a specified temperature of 62 degrees, ensuring the system retains its efficiency.

Heat exchangers are about the size of an oven and can cost anywhere from \$5k to \$25k. There's also a built-in environmental plus because they add green-building points, eliminate dust and improve the air you breathe inside your home.

But Renner's favorite part of the home is by far and away the Smart Home system made by Control4. The home's lighting, audio/video, and heating systems are operated by an integrated home controller. If you're watching a DVD, the lights can automatically dim by 50 percent; closets are on 10-minute timers; bathroom fans shut off after 15 minutes; and one of the nicest features—an "All Off" button at the back door. Through Control4, Renner can even access his home remotely over the internet. "The remote access feature is a huge benefit for second-homeowners," Renner says. "At any time, they can control the lighting, heating, and security, from in the house or from around the world. That's a great peace of mind."

Renner uses Control4 to manage his electric consumption. Summer or winter, the exterior lights automatically turn on at sunset. Renner programmed the system to dim the lights to 50% at 8 p.m., and to shut them off at 10p.m. "When you integrate all these things, it makes the house much easier to live in," Renner says. "It's kind of nice knowing you can push one button and go to bed rather than walking up and down stairs to turn off all the lights."

In Renner's case, green equals convenience. Every Control4 dimmer is \$100 vs. \$30 for a standard dimming light switch, so the expense was targeted more for peace of mind than a quick return.

Renner says he focused only on the energy efficiency components of building green. But after he applied it to the Town of Breckenridge's new Sustainability Code, he still would have had plenty of points left to spare. "My primary focus was conserving energy," he says. "Turns out, I could have built a home of more than 10,600 square feet with all the points I had just from doing what I did. We could have easily incorporated the waste reduction component, or utilized greener sustainable materials, and received more points."

Not surprisingly, Renner is now a strong supporter of the new Sustainability Code. "From our experience, the real cost of building green should only be \$5 to \$15 a square foot, or about 2-5% over and above the standard cost of construction in our market," he says. "But that expense is quickly recouped through the energy savings created for the home, which should make it a break-even proposition."

In Renner's mind, it's a cost that pays for itself, conserves energy, reduces carbon footprints and plays into the theme of going green. Try telling him now his efforts weren't worthwhile: Renner's Xcel rebate check, which came two weeks after he submitted it, was used to buy a new car. He's still grinning today.

For more information regarding green building and Pinnacle Mountain Homes call 970.453.0727 or visit them online at www.pinnaclemtnhomes.com.