Building Science

Posted on: December 19, 2012

CASE STUDY: OREGON VINEYARD HOME TAPS INTO WATER AND ENERGY CONSERVATION

LEED-Platinum villa encompasses solar power, rainwater reclamation strategies, and extreme insulation.

By Jennifer Goodman

Slideshow

Three Towers

View All 14 Photos >

Insulating and sealing a remodeled dwelling to be as airtight as a new home may sound nearly impossible, but that didn't stop an Oregon builder from attempting to achieve extreme levels of performance on a LEED-Platinum renovation in picturesque wine country.

The project involved repurposing a cramped cottage into a Mediterranean-style sustainable showpiece. The builder, McMinnville, Ore.-based Cellar Ridge Construction, started by deconstructing the cottage's second floor and beefing up the walls, ceilings, and floor with nearly double the insulation required by code. The hefty insulation package includes R-43 walls with 1 inch of spray foam and 9 inches of blown-in fiberglass; an R-59 ceiling with 4 inches of spray foam and R-38 batt; and R-60

floors made of open web trusses filled with blown-in fiberglass. The locally made fiberglass insulation is composed of 30 percent post-consumer recycled material.

For even-higher performance, Cellar Ridge included thermally broken walls and a conditioned attic space, says project manager Carson Benner. Once the house was complete, a blower door test revealed an airflow rate of two air changes per hour at 50 Pascal, lower than required by the 2012 IECC for new construction. (Click here for more on blower door testing.)

For fresh air ventilation, Benner specified a Lifebreath HRV, MERV-13 air filters, and automatic garage exhaust system, and incorporated special techniques for stabilizing the air pressure in the 3,459-square-foot house. For example, the clients' huge 600-cfm range hood could have posed a big problem. "It could have been a disaster with the back pressure," Benner says.

Seventy percent of the construction waste from the outdated and drafty English-style cottage was diverted from landfills.

He asked Cellar Ridge's HVAC contractor set up a relay on the hood so that when it's operating, the HRV intake automatically turns on to balance the pressure. "The homeowner doesn't ever have to think about it," he says. "It was $35 of switches and wire to have such a big problem solved."

Designed by Matthew Daby of Portland-based m.o.daby design, the stucco-sided home, dubbed Three Towers, encompasses many other resource-minded features including a super-efficient 15.5 SEER/8.7 HSPF HVAC system, 98-percent efficient Navien on-demand water heater, reclaimed wood flooring, and rainwater recycling. A 5 kW ground-mounted solar array, located 20 feet behind the garage and discreetly hidden by shrubbery, provides about one-third of the home's power.

The homeowners, a retired couple who moved from overcast Bainbridge Island, Wash., were thrilled with the seven-acre site's abundant natural light and requested plentiful glazing, with no blinds to block the views or sunshine. Douglas fir Kolbe windows, which provide an average U-value of 0.28, were tuned for optimum solar gain, especially on the south side.

The owners love the modern amenities tucked away in their Old World-style home. "It's a very traditionally appearing home with all green features built into it," Benner says.