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HOME PERFORMANCE MEETS GREEN RENOVATION

The EarthCraft House Renovation program gives existing homes the green treatment.

by HOWARD KATZMAN

In 1991, Dennis Creech and his wife, Callie Pendergrast, were looking to expand and renovate their 1950s ranch-style house. They needed additional space for their teen daughter, and they also wanted to update the original kitchen and bath; at the same time, they also knew that, if possible, they should do everything they could to correct problems they had noticed in the house. Moisture had been an issue for years—there was evidence of crawlspace water intrusion; the bathrooms lacked exhaust fans; and mold formed on walls in adjacent rooms. Room temperatures were uneven.

As executive director of Southface Energy Institute in Atlanta, Creech was well aware of the link between indoor air quality (IAQ) and energy efficiency. At the time Creech and Pendergrast were looking to renovate their ranch house, Southface was piloting EarthCraft House, a green building program that it had developed jointly with the Greater Atlanta Home Builders Association. Earthcraft House already had plans on the drawing board to develop a renovation component to complement the new home program. The Creech-Pendergrast residence became the test house for the EarthCraft House Renovation program.

The first step in EarthCraft House Renovation is to assess the house to identify opportunities to improve the home's performance in areas that can be incorporated into the renovation pro-



The foundation for the addition at the Creech-Pendergrast home renovation project includes edge insulation, which significantly improves the home's thermal envelope.

ject. EarthCraft House Renovation focuses on improving home performance as well as lessening the environmental impact of renovation (see “A Greener Career”). To qualify for certification in the program a home must be scored on a worksheet. Points are awarded in the areas of the building envelope, HVAC, ventilation, water, fixtures and finishes, waste management, outdoor projects, and homeowner and contractor education. The larger the scope of the project, the more points are required to achieve certification. While some gut renovations can be treated as virtually a new home, more modest projects do not have the same potential for increasing envelope and duct system tightness. More points are awarded for more substantial improvements in air

infiltration and duct leakage reduction. Points are also awarded for conservation alternatives. For instance, points are awarded if the added finished area is conditioned using the original HVAC system—this rewards envelope improvements and duct sealing that improve overall performance.

An assessment of the Creech-Pendergrast residence confirmed what Creech had suspected. The home was leaky ($\pm 0.8 \text{ ACH}_{\text{nat}}$), with a leaky duct system located in the ventilated crawlspace. Correcting these leaks and the moisture and mold problems alone would improve the IAQ, comfort, and efficiency, but incorporating these repairs into a renovation and addition would provide more opportunities to make the project greener (see “Project Score-



HOWARD KATZMAN

The family room addition features roofline and walls insulated with spray-applied cellulose.

card—The Creech-Pendergrast Residence”). The project scope included an addition of 960 ft² of finished space on two levels for a master suite and family room, and a renovation of the existing bath and kitchen.

The results are pleasing to the eye with comfortable, airy, healthy spaces. Determining the additional costs to make the project greener is difficult, because Creech and Pendergrast included items like dehumidification, air

and duct sealing, exhaust fans, and low-VOC paint for their health benefits, regardless of their cost.

After the renovation, use of electricity decreased—which is notable, given that the house was now significantly bigger. Winter electricity use decreased by 36%. This decrease is due to reduced run time on the furnace electric blower and to the improved thermal envelope. The improved thermal envelope also accounts for a 17% decrease in summer electricity use. The summer reduction is probably not as large due to the use of the dehumidifier, which, while sacrificing some energy conservation, does improve air quality.

Improvements to the building envelope included blowing cellulose insulation into exterior walls and ceilings and sealing the crawlspace and basement. These improvements allowed Creech and Pendergrast to use the existing furnace and air conditioner to

A Greener Career

ToNi Nue had a successful career marketing products internationally. But while she loved her business, she also possessed a lifelong passion for environmentally responsible development. In 2004 she saw a way to combine the two when she inked an agreement with Icynene to distribute their soft-foam insulation and air barrier system product in Europe. As she learned more about the product, the idea of making green development a career grew more attractive. Seeking a more thorough education in her new field, she discovered Southface Energy Institute in her hometown of Atlanta, Georgia. Nue enrolled in their spring 2003 weekend homebuilding course, and followed it up with a nine-day class in October 2004.

Eager to put her new skills to the test, Nue bought her first home early in 2005, intent upon renovating it to the EarthCraft House Renovation standards and then reselling it. She is positioning



TONI NUE

A contractor works on the gut renovation of ToNi Nue's house, which will meet EarthCraft House Renovation standards.

her homes to be “beautiful, comfortable, and healthy.”

Nue is convinced that there are buyers in the market for renovated homes that are healthier and more efficient but who “don't know how to articulate it until the choice is presented to them.” She firmly

believes that good planning allows the developer to incorporate advanced features at a small enough increase in cost to be acceptable to buyers.

In her first gut renovation, Nue installed spray-applied foam at the roofline, in the exterior walls, and under the floors to ensure a tight, comfortable, and quiet home. All of the windows and the HVAC systems will be replaced. To comply with historic district regulations, windows on the front and sides visible from the public right-of-way must be wood framed. Ducts will be inside the envelope rather than in an unconditioned attic or crawlspace. A fresh-air intake and low-sone bath fans will be used for ventilation. When finished, Nue's two-bedroom, two-bath home will be a perfect fit for a young couple eager to live on Atlanta's emerging west side.

Project Scorecard—The Creech-Pendergrast Residence

The scope of the renovation on this 1950s house expanded to include plenty of green measures.

Building envelope improvements

- Air-sealed chases and penetrations using rigid insulation board, sheet metal, caulk, and spray foam
- Expanded building envelope to include attic of addition and crawlspace
- Blower door results showed 60% reduction while the envelope was significantly increased
- Made extensive use of spray-applied cellulose in exterior walls, addition roofline, crawlspace walls
- Installed slab edge insulation on addition
- Replaced windows and doors (low-e, low SHGC glass, insulated doors)
- Made HVAC and IAQ improvements
- Reused existing 80 AFUE and 12-SEER equipment while adding 960 ft² of conditioned space
- Reduced duct leakage from 80% to 6%
- Incorporated all of the ductwork inside the envelope
- Installed whole house dehumidifier with filtered fresh air intake for the duct system

- Installed pleated media filter on duct system
- Installed efficient exhaust fans with digital timers in baths
- Installed ultraquiet kitchen range hood over gas stove

Appliances and lighting

- Replaced obsolete appliances with Energy Star refrigerator and dishwasher
- Replaced all incandescent bulbs with CFLs
- Fitted new fixtures with pin-type fluorescent bulbs

Water reduction measures

- Installed low-flow (1.6 GPF) commode and low-flow showerhead in one bath
- Installed Energy Star dishwasher
- Plans to replace second commode with dual-flush commode and to replace clothes washer with horizontal axis unit

Green materials

- Used prefinished hardwood flooring to reduce emissions in home
- Purchased doors from salvage

- Used low-VOC paint
- Used composite flooring (recycled plastic and wood) on exterior deck
- Used fiber cement siding on addition
- Used fly ash concrete for new footing and slab for addition

Waste management


- Sold original sink to salvage
- Hand pulverized drywall scraps and applied them as soil amendment
- Constructed garden shed with 50% salvaged building materials (lumber, siding, door)
- Reused original kitchen cabinets in garage and basement

Outdoor projects

- Used xeriscaping to reduce need for watering
- Reduced turf area
- Made plans to install rainwater harvesting
- Redesigned entryway for accessibility
- Purchased hybrid car



As part of the lighting improvements, the Creech-Pendergrast residence was fitted with new pin-type fluorescent bulbs.

condition the expanded house, in spite of the fact that they had added almost 1,000 ft². This saved approximately \$5,000, offsetting other costs. The house is more comfortable and mold has been eliminated, resulting in better air quality. Now the owners wouldn't have it any other way. 

Howard Katzman is a technical project manager at Southface Energy Institute and also manages the Home Performance with Energy Star, Radon, and EarthCraft House Renovation programs.

For more information:

For more information on the EarthCraft House Renovation program, go to www.southface.org/web/earthcraft_house/ech_main/ech_renovation.htm.