

Going, going green

June 22 2009, By Holly Hayes

Steve and Beth Griffith and their family thought they were well on their way to living an energy-saving green lifestyle.

Almost all of the light bulbs in their South San Jose, Calif., home are compact fluorescents. They do laundry in the evenings to take advantage of non-peak [electricity](#) rates. They keep the thermostat down in the winter and use passive-cooling techniques to stay comfortable in the summer. The household has two hybrid vehicles. And when it came time to do some remodeling, they recycled an entire kitchen from a Menlo Park, Calif., tear-down and trucked it down the Peninsula in pieces to reassemble in their 1971 tract house.

What more could they do to soften their [carbon footprint](#)? Turns out, a lot.

The Griffiths -- who live under the same roof with 15-year-old son Aaron, 11-year-old daughter Annie and Beth's mother, Nan Rasmussen -- signed up to have just about every nook and cranny of their home scrutinized by Sustainable Spaces, a Bay Area company that specializes in what it calls a "whole house" approach to maximizing comfort and [energy efficiency](#).

The assessment provided them with a road map to a greener, healthier home. Some of the recommended changes were relatively inexpensive, painless things the family could start doing right away; some called for modest cash outlays. Others will require some long-term budgeting.

The process began with an interview with the homeowners to uncover concerns and expectations. The Griffiths were unsettled by a spike in their PG&E bill following what they thought was an energy-wise remodel that upgraded the kitchen and added a bedroom suite for Rasmussen. The spacious suite has dual-pane windows -- also purchased as recycled goods -- but always felt colder than the rest of the house.

They also wondered if they should replace their furnace, which was original to the house, and whether a tankless water heater would be more efficient. Like many families, they have a lot of energy-sucking electronics: flat-screen TVs, computers, stereos, cell phone chargers and the like. And looking ahead a few years, when they will need to replace the roof, the Griffiths wanted to know if their home was a good candidate for solar panels.

But the Griffiths have adjusted their thinking about changes in their home as the economy has tanked.

"We were going to wait to do the solar panels, to see where we might land," said Beth Griffith, 43, a project manager at Apple. "But now, with the economy, we'll be staying put. We're thinking now that this is our forever house."

Armed with information from the interview, the technicians went to work.

In a five-hour session in March, they used a variety of high-tech gizmos and low-tech tests to scrutinize the home's insulation, ductwork, appliances, furnace, water heater -- pretty much anything that contributes to energy use and interior comfort.

Jason Bowers, a home performance specialist with Sustainable Spaces, explained the holistic approach that his company takes when doing what

it calls a "GreenUP." The whole-house assessment is a growing trend and has spawned California and national trade associations of contractors who focus on overall building performance.

"We approach the house as a system. You can't make a change in one part without it having an impact on another," Bowers said.

Bowers quickly assessed that the remodeling project and addition -- which boosted the home's original footprint from 1,284 to 1,856 square feet -- was having a bigger impact on the whole house than the Griffiths realized.

The 38-year-old furnace, located in the unheated garage, still had plenty of firepower to supply the home's heating needs. But the original ductwork was another story. When the addition went on, new ductwork was connected to the old stuff, which changed the heat distribution throughout the house. Rasmussen's room, in particular, was getting just a fraction of the warm air compared with the other rooms.

"The size of the room, the fact that it has three exterior walls and the fact that it's not only farthest from the furnace but also nowhere near the thermostat are all contributing to the lack of comfort in that room," Bowers said. "The front of the house is heating up much more quickly than the rest. That back bedroom just never has a chance to heat up at all."

The insulation in the ceiling of the addition, which the Griffiths installed, also was deemed inadequate. Ceilings in the rest of the house have blown- or poured-in loose cellulose that settles over time to create a cozy barrier to heat loss; the addition has fiberglass batting in the ceiling that is unevenly attached to the framing, allowing air leakage.

Bowers had other bad news to deliver. The plenum on the furnace -- the

sheet metal box that acts as the central manifold for other ductwork to connect to -- was covered with asbestos. And the old, leaky ductwork was connected with asbestos tape. Asbestos was widely used in buildings -- in insulation, roofing, flooring and ceiling materials, among other things -- before being banned in the late 1970s.

"We see a lot of this," Bowers said. People who are consistently exposed to asbestos are at a higher risk to develop lung and other types of cancer. "Asbestos is dangerous when it frays and becomes airborne."

Removing the asbestos was recommendation No. 1 on Bowers' list for the Griffiths. Replacing the ductwork with an airtight system came in at No. 2.

Replacing the aging furnace, adding a programmable thermostat and a high-efficiency pleated air filtration system, however, are things that Steve Griffith wants to put on the back burner, at least for awhile.

"I know it's old and we need to replace it," said Griffith. "But if we have more than enough BTUs in the existing furnace, maybe phasing in some of these things makes the most sense right now." Bowers said the new ductwork could be installed to accommodate a new furnace when the family is ready. "It wouldn't be perfect at first, but it would be better," Bowers said.

"I love the phrase 'road map,'" said Griffith, 47, who teaches kindergarten and is devoted to recycling. "Some contractors come in and give you a bid for all this stuff and it's just scary. Huge bids just turn you off. I like that we can phase in these changes."

Other upgrades recommended by the Sustainable Spaces team included sealing areas where warm air is escaping to the outdoors, including around the numerous can lights in the ceilings, plumbing pipes that

exhaust to the roof and electrical outlets. The team also suggests that new blown-in cellulose insulation in the ceiling of the addition would boost energy efficiency.

An on-demand tankless water heater -- as green as they can be -- really doesn't make sense for a family of five living under one roof, Bowers said. "They use a lot of gas to get water heated from 50 degrees, which is about the temperature it enters the house from the street, to 120 degrees for your shower," Bowers said. "It's like a jackrabbit start in your car. It wastes gas."

But the old 40-gallon water heater, with its minimal insulation, should get the boot. Bowers recommended a new highly insulated 50-gallon water heater with a demand circulation pump. The pump is activated by push buttons in the kitchen and bathrooms and moves hot water to sinks and showers quickly when they are about to be used. "You get hot water without wasting any water or energy," Bowers said.

Also on the list: a new Energy Star-rated, front-loading washing machine to replace the aging 1992 Kenmore top-loader in the garage -- again, saving water and energy.

What about all those energy-hog, always-on electronics?

"The numbers add up pretty quickly over the course of a year when you can lose two to three kilowatt hours a day to this stuff," said Bowers, who suggests the Griffiths plug their computers, TVs, modems, game consoles, phone chargers and other toys into power strips so they can be turned off when not in use.

Bowers described one model that comes with a remote so the power strip can be activated even while it remains hidden behind furniture, like a bookcase or media center. DVRs, which must stay plugged in so they

can record programs, get plugged into a separate outlet. Another model turns the TV into a "master plug" so that when you turn it off, everything else goes off, too.

And solar? That's another project for down the road.

"We like to tell you which steps you can take to reduce your electrical use first, and then have your home analyzed for solar," Bowers said. "If the solar system is sized appropriately for your use, you get the maximum benefit without generating too much energy. You don't get to sell it back to PG&E. It's basically a donation."

HOME ASSESSMENT PROCESS

- **BLOWER DOOR:** Andrew Dunn, a home-performance technician with Sustainable Spaces, runs a diagnostic tool called the blower door test to measure airtightness and locate air leaks in the Griffiths' home. A high-powered fan -- attached to a panel that is stretched taut over the front door is connected to pressure-sensing devices that indicate how much air moves in and out of the structure. Sealing leaky spots will reduce energy consumption and make the home more comfortable.
- **LIGHT BULBS:** One of the easiest ways to dramatically trim electrical usage is to replace incandescent light bulbs with energy-efficient compact fluorescent bulbs, like the ones shown here. Some of the latest versions have the familiar shape of incandescent bulbs and can be deployed in spotlights and recessed lights as well as lamps and other fixtures.
- **BALOMETER:** A Balometer is lifted up to each of the home's heating vents to measure the amount of conditioned air that is flowing. After

entering separate calculations for each vent, a computerized model will show that the home's aging ductwork is not delivering warm air in equal amounts to all of its rooms.

- **BEING SAFE:** You never know what you might encounter when climbing into an attic crawl space. Jason Bowers, a home performance specialist with Sustainable Spaces, is careful to don a special mask to protect himself from breathing in dust, asbestos, fiberglass or other particulates.
- **INFRARED CAMERA:** Bowers uses an infrared camera to measure the temperature of the interior walls in the Griffiths' home. These calculations help the technicians judge the performance of insulation in the walls.

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