

## House Calls

Energy-efficiency audits can find savings in places where consumers might never think to look

By JACLYNE BADAL

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Help the environment and save money at the same time.

That is the pitch used to sell home energy-efficiency audits -- professional inspections aimed at identifying where a home is wasting energy and how the problems can be fixed.

Homeowners are heeding the message as interest in conservation and concern over rising energy costs grow. While organizations such as the Lawrence Berkeley National Laboratory, operated by the University of California for the Department of Energy, offer free, do-it-yourself online audits, a growing number of homeowners are paying hundreds of dollars for customized recommendations from professionals to ensure they get the best return on their investment.

Kevin Zeese and his partner, Linda Schade, shelled out \$495 in late August for an audit on a newly purchased home in Baltimore because they wanted help in prioritizing energy-efficiency upgrades. They say conservation is important to them, so they earmarked profits from the sale of a former home near Washington for energy improvements at the new one.

"Voting with your dollars is sometimes more effective than voting with your vote," says Mr. Zeese, who, like Ms. Schade, runs a political-advocacy group.

Going into it, the couple had their eye on high-profile, high-dollar changes, like solar panels for the roof, says Ms. Schade. But the auditor, TerraLogos Green Home Services Inc., surprised them.

Their first priority, TerraLogos said, should be to find a way to water the garden without wetting the porch, and to water less, since the audit found water damage on the basement walls and under the porch. If water damage persists unchecked it can create structural issues, such as cracks in the walls, that can lead to air leakage. Moisture also can damage basement insulation.

### Too Airy

Next up: Seal air leaks and improve insulation in places like the attic and basement. On a normal day, the air in the interior of their 1902 row home is replaced by fresh air coming in through ventilation and leaks about once every 50 minutes, a rate that could increase to

once every three minutes on a day with 20-mile-per-hour winds. The changes suggested by TerraLogos are aimed at reducing air loss, thus slashing the energy needed to heat and cool the house. (The target air-change rate for new homes is about once every three hours.)

"I don't think we'd ever heard of air sealing," Mr. Zeese says. The couple asked a pair of contractors to bid on the air sealing and insulation in September. The costs were \$1,500 for each service -- and they plan to have the work done this month. The auditor says air sealing should reduce heating and cooling costs 10% to 35%, with insulation further lowering bills 10% to 15%.

Auditors say it is fairly common for a report to surprise clients.

People usually think of double-pane windows when envisioning a "green" home, for instance, but window upgrades tend to be one of the last recommendations. New windows certainly provide energy savings, but they are rarely the best buy. The cost of replacement is high, more than \$10,000 for many homes, and the savings are relatively small, meaning payback can take more than a decade. The same is true for solar panels, which can provide big savings but often come with prohibitive costs, say \$20,000 for a small system.

### **Targeting the Humdrum**

Auditors often will target the humdrum solutions that provide big benefits relative to the cash outlay, like installing low-flow shower heads and insulating water pipes.

The audit itself is a relatively straightforward process. Depending on the number of tests run, it takes anywhere from an hour to an afternoon.

Auditor Peter Manjuck, founder of SoCal Home Inspections in San Diego, charges \$250 for a house of up to 2,500 square feet. Larger homes, up to 4,000 square feet, cost \$325. Mr. Manjuck -- who says he is getting twice as many requests for audits, about 20 to 30 a month, as he was last year -- measures the perimeter, notes the types of windows and doors, wriggles into the attic and crawl spaces and records the makes and models of major appliances. The job takes about 75 minutes.

Later, he punches the data into a program from GeoPraxis, an energy-efficiency research-and-development firm in Sonoma, Calif. The program recommends fixes, ranked by how long it takes to recoup the investment.

A recent audit for a three-bedroom, one-bathroom house built in 1957, for example, says the most cost-effective upgrade is to replace incandescent bulbs with compact fluorescents, at a cost of \$35 and an annual saving of \$87. The bulbs should pay for themselves in five months. The upgrade with the longest payback is installing a programmable thermostat, which should cost \$162 but saves only \$26 per year -- a payback period of six years and three months. The most expensive suggestion in the

report: Increase attic insulation, at a cost of \$772, for an annual saving of \$315, or a payback of two to three years.

**Setting Priorities**  
A cost-benefit analysis of recommendations for a three-bedroom home in San Diego from an energy audit last month. The home was built in 1957 and has 1,485 square feet. Savings and costs are estimates.

Recommendation	Annual Saving	Cost	Years to Payback
Switch to compact fluorescent lights	\$87	\$35	0.4
Insulate water-heater pipes	7	6	0.9
Install low-flow shower heads	17	15	0.9
Increase attic insulation	315	772	2.5
Reduce air infiltration and drafts	29	74	2.6
Install programmable thermostat	26	162	6.2

Source: SoCal Home Inspections

The report also lists some no-cost tips for energy conservation. One suggestion: Don't set the air conditioner to a lower-than-normal setting when first starting it. "Your home will not cool any faster at the lower setting, but your energy expenses will be higher" because cooling to the lower temperature takes longer.

A full TerraLogos audit takes three hours and includes a blower door test, which depressurizes the house so the auditor can scan for leaks in each room, and an infrared scan, which can find missing insulation and hidden air pathways. The cost for the full audit is \$495, while a simple visual audit runs \$345.

The report sorts fixes not by the time to payback but by the order in which they should be completed, to provide the biggest improvements in the most logical way. Air sealing, for example, is often recommended before insulation because it is almost impossible to access air leaks to seal them if new insulation is laid down first, says Peter Van Buren, the Baltimore company's director of green energy.

### Financing the Fixes

Homeowners seeking an audit should first contact the local utility to see if it offers free or discounted audits. If not, consider looking into the Home Performance With Energy Star program sponsored by the Environmental Protection Agency and the Department of Energy. A link is available at [EnergyStar.gov](http://EnergyStar.gov). From there, consumers can see if their state sponsors a program and get local details.

New York residents, for example, are directed to [GetEnergySmart.org](http://GetEnergySmart.org), which links people to auditors who are accredited by the Building Performance Institute, a national organization. People with low incomes may qualify for government subsidies. The site

also offers information on financing programs for energy-efficiency improvements, such as the New York Energy Smart Loan Fund, which knocks four percentage points off the loan's interest rate for as long as 10 years, and the Homeowner Financing Incentive, which reimburses homeowners as much as 10% of the cost of improvements, up to \$3,000.

Other options include a \$500 tax credit from the federal government for certain energy-efficiency upgrades made during 2006 and 2007, and low-interest unsecured Energy Star loans available in several states for amounts up to \$20,000.

While some people recover the costs of energy-efficiency upgrades in as little as two to three years, other remedies -- such as new heating or cooling systems -- may increase energy efficiency, but not by enough to ever pay off.

Philip Spevak, a pediatric cardiologist at Johns Hopkins Children's Center, originally looked into an energy-efficiency audit as a way to lower his "huge utility bills." Dr. Spevak was using more than 2,000 gallons of oil per year for his 1903 home, at a price of \$2.60 per gallon. He figured an audit would help him save money and, in the process, help the environment.

It didn't go as planned. The auditor suggested two major improvements: Overhaul the old air-conditioning unit, which was leaking a lot of air, and upgrade the insulation in the 3,000-square-foot house. The auditor provided cost estimates for the work, but the contractor bids came in much higher.

### **'The Right Thing'**

Dr. Spevak went ahead with the fixes anyway -- \$13,000 for the air conditioner and \$8,000 for the insulation. Some of the work, like sealing air leaks, he did himself.

So far this year, Dr. Spevak's electricity usage is down 20% to 40%, compared with 2006. He will get a better picture of his oil savings this winter, when heating bills start to roll in.

At the high end, his savings may total a couple of thousand dollars a year, so "to pay off \$21,000 is going to take a long time of lower energy bills," Dr. Spevak says. Because he plans to move in five to 10 years, he is doubtful he will make his money back in energy savings. Still, Dr. Spevak says he is glad he went ahead with the upgrades.

The house is more comfortable, and the reduced air loss will act as a hedge against rising oil costs. Just as important, he says, "it was the right thing to do" from an environmental standpoint.

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