



BY LISA COHN

BOB AND SUE PAYTON started researching energy-efficient homes after noticing that as family members aged they often cranked up the heat and penned larger and larger checks to their utilities. “With energy costs going up, we want to be warm when we’re older and not worry if we can afford it,” says Sue Payton. “We know that an energy-efficient home will cost more initially, but the payback will benefit us in the long run.”

METHOD HOMES BUILDS MODULAR HOUSES, SUCH AS THIS 2,600-SQUARE-FOOT MODEL IN THE CABIN SERIES, THAT ARE DESIGNED TO QUALIFY FOR LEED CERTIFICATION.

They hired Ted Clifton, CEO of Zero-Energy Plans LLC, based on Whidbey Island, Washington, to help them realize their goal. Clifton built the couple a two-bedroom home, with 1,468 square feet of living space, on the central part of the island,

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which is about 60 miles north of Seattle.

He completed the house in March 2011, and the Paytons added a solar-energy system last October. The ultra-efficient home has brought their total energy consumption to “net zero,” which means that the house produces as much energy as it consumes.

The Paytons' home has various efficiency features that are low tech and low cost, such as “passive solar” aspects related to siting and materials. For instance, windows are oriented to allow winter sun to shine in, and floors are made of tile and other materials that can be warmed by the sun and retain heat. The largest side of the home faces southwest for maximum sun exposure, and there are few windows on the northeast and northwest sides. Roof overhangs were designed based on the differing angles of the sun in the winter and summer, with the overhangs' length and shape allowing as much sunshine as possible to enter through the windows in the winter but shading the windows in the summer.

“Together, orientation and window placement can save you 40 percent on heating and air-conditioning,” says Clifton. Other energy-efficiency features are higher tech and higher cost, such as the \$23,000 photovoltaic solar system (which they may someday use to power an electric vehicle) and the low-energy heating, ventilation and air-conditioning (HVAC) system that controls how much outside air can enter the home. The house also has insulation that exceeds building-code requirements; double-pane glass; high-efficiency appliances; and a tight building envelope (meaning the way the foundation, roof and walls are constructed and fit together) to reduce air leakage, keep moisture out, and keep heat in when it's cold outside but keep heat out during warm weather.

Last year, Zero-Energy Plans earned a silver level EnergyValue Housing Award for the home from the U.S. Department of Energy. The EnergyValue Housing Awards program, which ran from 1996–2012, was designed to recognize builders who voluntarily incorporated energy efficiency into home construction. Overall, the additional cost of the energy-efficiency measures—about \$43,000—is expected to be recouped within seven years by the amount of energy savings, says Payton.

“We really like the comfort of the house,” she

Home Energy Checklist

Below are some energy-efficiency ideas from the website of the nonprofit American Council for an Energy-Efficient Economy, which provides a glossary of energy-related terms and other consumer resources (www.aceee.org).

To Do Today

- Turn down the temperature of your water heater to the warm setting (120°F).
- Start using energy-saving settings on refrigerators, dishwashers, washing machines, and clothes dryers.
- Survey your incandescent lights for opportunities to replace them with compact fluorescents (CFLs). These lamps can save three-quarters of the electricity used by incandescents. The best targets are 60-100W bulbs used several hours a day.
- Check the age and condition of your major appliances, especially the refrigerator. You may want to replace it with a more energy-efficient model.
- Clean or replace furnace, air-conditioner, and heat-pump filters.
- If you have one of those silent guzzlers, a [heated] waterbed, make your bed today. The covers will insulate it, and save up to one-third of the energy it uses.

This Week

- Buy low-flow showerheads, faucet aerators and compact fluorescent light bulbs, as needed.
- If you have an electric water heater that is old enough that its insulation is fiberglass instead of foam, it likely will benefit from a water-heater blanket from the local hardware or home-supplies store.
- Rope caulk very leaky windows.
- Assess your heating and cooling systems. Determine if replacements are justified, or whether you should retrofit the systems to make them work more efficiently to provide the same comfort (or better) for less energy.

This Month

- Collect your utility bills. Separate electricity and fuel bills. Target the biggest bill for energy-conservation remedies.
- Crawl into your attic or crawlspace and inspect for insulation. Is there any? How much?
- Insulate hot water pipes and ducts wherever they run through unheated areas.
- Seal up the largest air leaks in your house—the ones that whistle on windy days, or feel drafty. The worst culprits are usually not windows and doors, but utility cut-throughs for pipes (“plumbing penetrations”), [continued next page]

[continued from prior page] gaps around chimneys and recessed lights in insulated ceilings, and unfinished spaces behind cupboards and closets.

Better yet, hire an energy auditor [to do a blower door test] to point out where the worst cracks are. All the little, invisible cracks and holes may add up to as much as an open window or door.

- Set your thermostat back (forward) when you can accept cooler (warmer) conditions. This generally includes nighttime and whenever you leave your home for several hours. Many people find it easier to use an Energy Star programmable thermostat that will automatically adjust the thermostat based on your time-of-day instructions.

- Schedule an energy audit for more expert advice on your home as a whole, or learn how to conduct your own by visiting the Home Energy Saver website (<http://hes.lbl.gov>).

This Year

- Insulate. If your walls aren't insulated, have an insulation contractor apply blown-in insulation (cellulose or fiberglass) to the walls. Improve your attic insulation if recommended during your energy audit.

- Replace aging, inefficient appliances. Even if the appliance has a few useful years left, replacing it with a top-efficiency model is generally a good investment.

- Upgrade leaky windows. It may be time to replace them with energy-efficient models or to boost their efficiency with weatherstripping and storm windows.

- Have your heating and cooling systems tuned up in the fall and spring, respectively. Duct sealing can also improve the energy efficiency and overall performance of your system (warm-air furnace and central air-conditioners).

says. “Nice even heat—and passive solar works great in the winter. Amazing how quickly just a little sun can add a few degrees to the warmth of the house.”

The Paytons' home is a good example of how homeowners can reduce their energy costs and improve the comfort of their dwellings by investing in energy efficiency. While many believe it's not possible to build a net-zero home in the Northwest climate, that's a misconception, says Brian Abramson, co-founder of Seattle-based Method Homes, which constructs prefabricated energy-efficient homes that range in price from \$85,000 to \$1 million. The homes are all built to qualify for LEED—Leadership in Energy and Environmental Design—certification, he says, and homeowners can submit the paper-work to have their homes officially LEED certified.

“Net-zero homes are becoming more popular in the Pacific Northwest as the ways to reduce energy loads become more refined,” says Abramson. “These include efficient sources of heat such as modern heat-pump systems, domestic-hot-water technologies such as solar hot-water pre-heaters, and tighter building envelopes and better insulation using new house wraps [the material installed between the inner structure and the siding].”

For example, Henry Blueskin VP 100 is a peel-and-stick wrap featuring a polymer sheet with a patented adhesive technology designed to seal around nails and staples and thus do a better job of keeping out water and weather.

Energy efficiency is an important consideration whether you're building, remodeling or buying a home, says Timothy O'Shea, a vice president of Isola Homes in Seattle. "Don't just focus on whether the home has slab countertops and fancy lighting fixtures. Take time to understand exte-



rior weather sealing, insulation, window U-factor [an indication of heat loss] and ventilation. These factors determine how comfortable and healthy the house is over the long term."

OPower provides information that can help utilities and their customers track and decrease energy use. Since 2007, the company has helped more than 85 utilities achieve a total of more than 2 terawatt-hours in energy savings.

Energy efficiency can also be enhanced by changing daily behavior and choices, says Ogi Kavazovic, head of corporate marketing and strategy for Opower, a Washington, D.C.-area company whose software provides consumers and utilities with information and tools designed to decrease energy use. Since being founded in 2007, the company has helped more than 85 utilities, in seven countries, achieve a total of more than 2 terawatt-hours in energy savings—enough to power a city of 500,000 for a year, Kavazovic says.

Teresa Holland-Rich of Yakima, Washington, is getting Opower reports on her energy usage as part of a pilot program being conducted from August 2012 through December 2015 by Portland-based Pacific Power, which serves customers in three western states. Holland-Rich and her husband hadn't previously paid much attention to their energy bills, but the energy reports told them that their household was a top energy user, consuming 31

percent more than nearby pilot-program participants who had similar energy-usage patterns.

“We now pay attention to how we use things like appliances,” she says. For example, they follow the recommendations of a home-energy report that advised them to do a full load of dishes in the dishwasher and a full load of laundry each time to conserve energy. They also pay more attention to how they set their thermostat.

When people learn that their consumption is higher than that of most of their neighbors, they tend to react strongly, change their behavior and find ways to save, says Kavazovic.

Government agencies are also promoting energy efficiency. The Paytons, for example, earned a federal tax credit for their solar system, and their builder, Clifton, received a federal tax credit for building an energy-efficient home.

In Washington state, the Utilities and Transportation Commission works to reduce power plant-related global warming and pollution by assuring that utilities it regulates achieve all available, cost-effective, reliable and feasible efficiencies before investing in new—and expensive—power plants. That leads utilities to encourage residents to cut their energy consumption.

Puget Sound Energy, serving customers in 10 Washington counties, offers rebates for items ranging from ductless heat pumps to floor insulation to energy-efficient freezers (various requirements apply). The utility has energy advisers on staff to answer customers’ questions and also offers free HomePrint home-energy-use assessments that include free energy-efficient products such as high-performance showerheads and Energy Star-qualified compact fluorescent lightbulbs. (Consumers can learn more about compact fluorescent lights, including precautions, from the “Compact Fluorescent Lamps (CFLs) – Fact Sheet/FAQ” at www.fda.gov.)

Last year Puget Sound Energy’s energy-efficiency programs saved enough electricity to power more than 29,000 homes and saved enough natural gas to heat more than 6,000 homes. The goal for this year is to save enough electricity to power another 4,700 homes and enough natural gas to heat another 1,100-plus homes.

The nonprofit Energy Trust of Oregon—which began operating in 2002 after being

created and funded by the state legislature to lead the way in energy efficiency and use of renewable resources, and which is overseen by the Oregon Public Utility Commission—provides services and rebates that help utility customers in Oregon and parts of Washington save energy. Between 2002 and 2012, customers participating in Energy Trust programs saved enough electricity to power 370,000 homes for more than a year and enough natural gas to heat 55,000 homes for more than a year, says Lizzie Rubado, a spokeswoman for the Energy Trust.

Homeowners who want to take advantage of incentives should begin with one of the energy audits offered by the trust, Rubado says. “They also should get a free Energy Saver Kit that can be ordered from the Energy Trust website. This will get you high-performance showerheads, compact fluorescent lights and other items. You can pick which ones make the most sense for you.” Many utilities have similar kits available.

In general, says Rubado, the biggest energy-savings opportunities are in areas such as weatherization (for example, insulation), lighting, water heating and appliance upgrades to Energy Star standards. For example, you can trim lighting energy use by 75 percent by installing Energy Star-qualified compact fluorescent lights, she says.

Energy-related programs, rebates and incentives vary from state to state. For instance, the Montana Department of Revenue offers a personal tax credit of up to \$1,500 for installation of a residential geothermal heat-pump system, and Idaho residents can receive a state income-tax deduction for using alternative energy sources such as geothermal power. Avista Utilities customers in areas such as Spokane and northern Idaho can take advantage of a program in which the utility will pick up and recycle a working refrigerator or freezer manufactured before 1995 and pay the customer \$30 for it. A website funded by the U.S. Department of Energy summarizes and links to federal and state-by-state incentives; see www.dsireusa.org.

David Davis, a Boise, Idaho, control-system designer for a heating-and-cooling-automation company, developed and installed an “economizer” that cut his air-conditioning costs by about 40 percent, saving him about \$40 a year. Consumers who live in areas that have higher energy costs could potentially save more, he says.

WINDOWS ALLOW AMPLE SUNLIGHT TO ENTER THIS ISOLA HOMES RESIDENCE, WHICH QUALIFIED FOR A BUILT GREEN 3-STAR RATING. ENERGY-EFFICIENT LIGHTING AND PLUMBING FIXTURES ARE AMONG THE HOME'S MANY ENERGY-SAVING FEATURES.

The unit automatically brings in outdoor air to cool a home when it's more cost-effective to bring in that outside air than to continually chill and recirculate warmer indoor air. This situation may occur in the evening when temperatures drop. Many factors, such as type of economizer system, the amount of cool air required to adequately cool a room or a home, how cool nighttime temperatures are and the area's climate (homes in hot, humid climates are traditionally not good candidates for economizers) determine how effective an economizer is, but the right system in the right climate may allow homeowners to save on air-conditioning costs without having to open their windows. Economizers typically also have filters that limit the amount of pollen, dust and pollutants brought in from outside.

A former utility employee who says he tracks his energy usage more closely than most consumers, Davis also recently installed a computer-controlled lighting system. He uses the system with dimmer switches to set certain interior lights at 30 percent intensity at specific times. He can also easily turn the lighting all the way off or boost its intensity by changing the dimmer switch setting with his computer or smartphone, as well as manually. "On a 60-watt bulb, taking it to 20 watts is a decent savings," he says.

All the lights in the family room are part of the system, and they can be set to automatically dim

soon after the family usually finishes dinner, says Davis, who is the father of two sons, ages 6 and 9. A computer-controlled system is advantageous because his family can easily forget to turn lights down or off, he says.

"Before I got married, I liked the lights dimmed when I was by myself because I found it to be helpful in winding down my day. When I got married but didn't yet have kids, I liked dimming the lights because it made dinner and a movie feel like a date. Once I had kids, I quickly realized that turning the lights down early made my kids less resistant to going to bed."

An often overlooked benefit of building an energy-efficient home or upgrading the efficiency of an existing one is that doing so can improve ambience, comfort and quality, says O'Shea from Isola Homes, which has built numerous homes that qualified for a Built Green rating (www.builtgreen.net). These homes often are better ventilated, which improves air quality. They can provide consistent, comfortable heating or cooling, and they may have lighting that adjusts to different circumstances.

"A house that has deep quality is one that not just looks good, but lives well," O'Shea says. ■

Lisa Cohn is a freelancer in Portland, Oregon, who often writes about energy and environment.