



# Turning an ENERGY HOG into an EFFICIENT HOME

**If your home guzzles energy there's no better time than now to do green remodeling, because rebates and incentives still exist. A local green builder explains what your best bets are in terms of payback and the environment.**

*By Scott Rodwin & Ron Flax*

If your house is more than 15 years old, an energy-efficient remodel might be one of the best investments you can make this winter. Construction prices are rock bottom, rebates and incentives are still plentiful, and, equally important as the bottom line, your house will be more comfortable as you hunker down for the season.

But remodeling can seem overwhelming. Where to begin and what to do? Here are some steps to get your energy retrofit smoothly under way.

## **STEP 1 Get the Facts**

A few nonprofit organizations can quickly provide you with a wealth of reliable infor-

mation about rebates and streamlined energy-retrofit programs to help make your project affordable and easy.

Boulder's Center for Resource Conservation ([conservationcenter.org](http://conservationcenter.org)) has a wide range of useful information on local programs, as well as energy-conservation tips for homeowners.

Recharge Colorado ([rechargecolorado.com](http://rechargecolorado.com)) offers a complete list of current rebates and incentives; click on "GEO rebate overview" to see what's available and how to apply.

The Residential Energy Efficiency Program (REEP), formerly "Two Techs and a Truck," rolls out January 2011 for Boulder County residents. This groundbreaking program sends an energy auditor

to your home who can advise you about direct-installation measures, such as CFL bulbs, water-saving shower heads and faucet aerators, water-pipe insulation, basic air sealing and programmable thermostats.

The comprehensive audit (with a blower door and infrared camera) costs around \$120 and includes an independent “concierge service” that will assist you in understanding and implementing measures identified by the auditor.

The federally subsidized REEP offers standardized prices for some additional upgrades, such as insulation and advanced air sealing, which are coordinated by the concierge but performed by independent qualified contractors. This program is a great bargain, and goes a long way toward making energy retrofits painless and affordable.

If you own one of Boulder’s 20,000 rental units, which represent half of the city’s housing stock, be aware that the new SmartRegs ordinance ([boulder.colorado.gov/smartregs](http://boulder.colorado.gov/smartregs)) goes into effect in January, and may require some degree of energy-efficiency upgrade to most units.

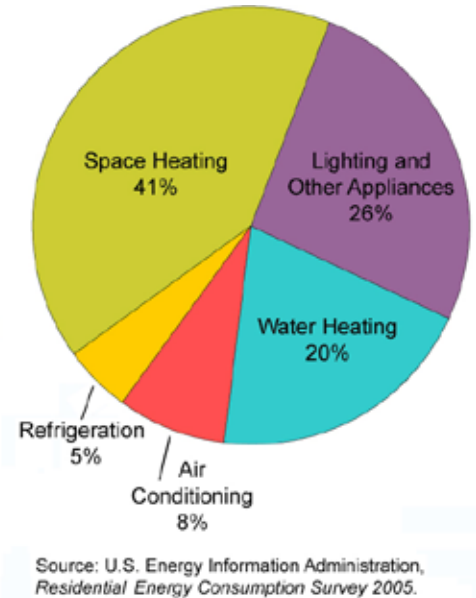
Although landlords have up to eight years to comply, jump on it now while rebates are available. REEP will offer a “SmartRegs Pathway” to help property owners plan for compliance. Additionally, the city is subsidizing the cost of REEP’s basic service for qualified affordable-housing owners.

## STEP 2 Identify Issues and Solutions

If you want a greener home, start with either an energy audit or a Home Energy Rating System (HERS). An audit is a quick analysis of your home’s energy consumption and generally costs about \$300 to \$500 (pre-subsidy). HERS (essentially a miles-per-gallon energy consumption rating for your house) includes a more thorough audit and computer-energy modeling that compares different retrofit strategies. It also includes several inspections during the remodeling or construction of your home. HERS, which costs between \$800 and \$2,000, is the country’s most widely used system of energy rating and is written

into both the city and county of Boulder’s green-building code requirements.

Make sure you deal with a Residential Energy Services Network (ResNET) certified HERS rater; ResNET is the organization that runs the HERS rating system, and certifies the raters that use it. If you





Although this home is traditional in appearance, Boulder's Rodwin Architecture outfitted it with many innovative green technologies that keep it comfy in all seasons and reduce heating and cooling costs.

PHOTO BY JULIA JONES



Insulating your home's attic and crawl space yields the biggest payback in terms of green-building retrofits.

PHOTO COURTESY ENERGYSTAR

have any combustion appliances in the home that are not “fully sealed combustion,” select a HERS rater that is also BPI-certified (BPI is similar to HERS, but specializes in mechanical systems).

Every home has different issues and opportunities, which is why it's important to hire a professional rather than just pick items from a prescriptive retrofit list. In addition to looking at your home, energy raters will usually want to review your past energy bills and discuss how you use your home in order to spot the greatest savings opportunities.

## Insulation

The biggest component of your energy bill is typically air infiltration. Especially in older homes, simply sealing leaks can often account for upward of a 30-percent reduction in your heating and cooling bill.

The auditor's blower-door test and infrared thermal imaging will quickly identify opportunities to improve your insulation and tighten your building envelope. Following the auditor around during this test is an eye-opening experience, and usually sheds light on many comfort issues in your home.

Spend the most effort at the top (attic) and the bottom (crawl space) of the home, as these have the biggest payback. Insulation contractors have many new tricks and tools that allow them to make significant improvements without having to open up walls. The results are cost-effective and often quite dramatic.

## Windows

For homes with older, single-pane windows, replacing them with double-paned, low-E windows will not only improve energy efficiency, it'll dramatically improve your comfort and cut down on noise from wind, traffic, etc.

Be aware that new windows are one of the more expensive green upgrades, often running between \$6,000 to \$10,000 per household for vinyl windows, double that for wood and double again for fiberglass. But prices vary widely in each category, so get quotes from multiple vendors.

If you have (or want) skylights in your home, consider replacing them with suntubes. Compared to traditional skylights, suntubes substantially cut down on heat loss in winter, and greatly reduce heat gain in summer. They're also an effective way to bring natural daylight into the interior spaces of your home.

## Heating & Air Conditioning

An auditor will also evaluate your mechanical systems. If you have an older furnace, water heater or boiler near the end of its useful life, replacing it with a high-efficiency unit will substantially lower your energy bills and improve your home's safety, as older units commonly release small quantities of combustion gases into the house. As you increase your home's overall air-tightness, these indoor air-quality issues become very important. It's also worthwhile to evaluate existing ductwork, as small fixes can have a big impact on comfort.

Consider installing a heat recovery ventilator (HRV). These systems allow you to bring a controlled quantity of fresh air into your home without the energy and comfort penalties of a leaky home. In super-tight homes, these systems are essential for both comfort and safety.

## Electrical & Lighting

An audit will also include appliances, lighting and plug loads. Upgrading to EnergyStar-rated appliances will considerably reduce your energy load, but compare the actual energy consumption on labels before purchasing an appliance.

Some of the most common electrical recommendations include replacing older refrigerators with energy-efficient models, and adding switched power strips on computers and accessories that draw electrical loads even when turned off.

Lighting has come a long way in the last few years. The latest versions of compact fluorescent light bulbs (CFLs) have good color rendition and no-flicker startup, and some are even dimmable. Over the course of their life, each saves you more than \$40 in electricity and typically lasts 10 times longer than incandescent bulbs. They also produce about 75-percent less heat than incandescent bulbs, which is important when considering cooling costs. There is a wide range of quality among CFL bulbs, so do your homework.

The biggest new player in lighting is light-emitting diodes (LEDs). Although these are still expensive at \$30 to \$80 per bulb, the cost is rapidly decreasing. LEDs have great color rendition and the highest efficiency, and last roughly 30 times longer than incandescent bulbs.

## STEP 3 Gettin' It Done

Once you've identified your energy retrofits, it's time to contract the work. The



**Suntubes are a great green alternative to skylights, as they substantially reduce heat loss in winter and heat gain in summer.**

Boulder Green Building Guild ([bgbg.org](http://bgbg.org)) provides a comprehensive list of experienced, local green-building professionals.

At a minimum, make sure your contractors present you with a copy of their insurance certificate, a warranty (1-year is minimum) and license number. Check multiple references, and ask to visit previous and current jobs when appropriate.

Get all contracts (and changes) in writing and have them checked by a

ILLUSTRATION COURTESY SOLATUBE



## TOP 10 COST-EFFECTIVE ENERGY UPGRADES

1. Hire an energy auditor or HERS rater.
2. Weatherize/seal air leaks.
3. Upgrade lighting.
4. Insulate attics, crawl spaces and basements.
5. Replace older furnaces.
6. Replace older water heaters or boilers (consider solar thermal panels).
7. Upgrade appliances, such as refrigerators, dishwashers and washing machines.
8. Insulate walls.
8. Replace single-pane windows.
10. Add photovoltaic (PV) panels.

—Scott Rodwin & Ron Flax

PHOTO BY CHRISTINA RICHARDS

lawyer whenever possible. Go over the scope of work to be performed in detail and make sure it's clear who will do things like pull the building permit, submit for rebates and clean up after the work.

Never pay more than 50 percent up front, and never pay the full contract amount until the work not only is completed, but passes final inspections by the building inspector. When appropriate, make sure your HERS rater also inspects the work before final payments are made.

Many people like to evaluate energy retrofits by the payback-period method.

That usually ignores the benefits of increased home value, enhanced thermal comfort and improved occupant health, as well as perennially increasing energy costs (more than 6 percent per year over the last 10 years).

That said, payback simply means the cost of the investment (say \$3,000 for weatherization) divided by the predicted annual savings (say \$1,000 per year), and voilà, you have a three-year payback. Both a HERS rating and an energy audit usually include an estimated payback period.

Most of the energy-efficiency techniques listed here have a simple payback of between one and 12 years. After that, it's money in your wallet. 🏠

*Scott Rodwin, AIA, LEED AP, and Ron Flax, ResNET, BPI, LEED AP, teach Green Building 101 for the city of Boulder and Boulder County. Rodwin Architecture (rodwinarch.com) and its construction and HERS-rating arm, Skycastle Homes (skycastlehomes.com), have created some of the country's most energy-efficient homes in Boulder County.*