

EFFICIENCY DETAILS

FOR A CLEAN ENERGY CHANGE

If you've been dreaming about lowering your electricity, space or water heating bills, but are daunted by the seemingly high up-front investment in renewable energy equipment, fear no more. Simple, energy-smart strategies can help you reduce both the size and cost of that renewable energy system you've been dreaming about.

by Paul Scheckel



No matter where you live—an uptown loft, a drafty old farmhouse, or a contemporary home—addressing your dwelling's energy efficiency and reducing your household's energy use should be done before you invest in any renewable energy (RE) gear.

You can reduce your use—without giving up modern comforts—by putting technology to work for you. New, energy-efficient appliances and heating equipment, along with advances in building science and awareness of our

energy use, allow us to do more in our homes with reduced energy input—the very essence of efficiency. But don't expect technology to do it all. Habits and behaviors greatly influence your energy consumption.

If you're connected to the utility grid, implementing these easy measures translates into lower utility bills. If you're planning an off-grid home, smart appliance and building design choices will both minimize renewable energy equipment costs, and reduce or even eliminate your reliance on a backup engine generator.

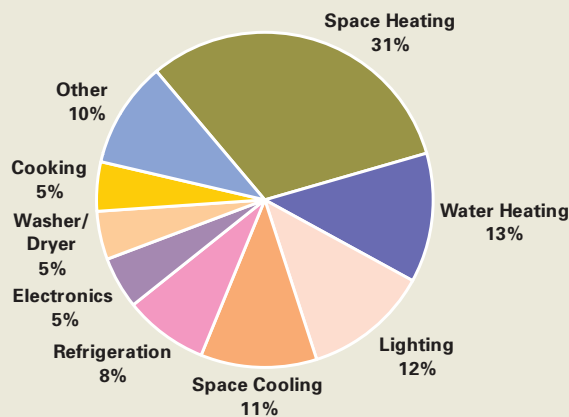
INEXPENSIVE ENERGY FIXES

Tip 1: Know Your Loads

The first step on the renewable path is to get familiar with how much energy your household uses and identify where your energy dollars are going. Take a look at a year's worth of your energy bills. Determine how much energy is used for space and water heating, air conditioning, and other electrical loads.

Depending upon where you live, you may find certain seasonal trends that lead to increased energy consumption. For most of us, space conditioning consumes the most energy and generally warrants the most attention when it comes to efficiency efforts. Water heating is typically the second largest home energy user.

Typical Household Energy Uses



Courtesy www.eere.energy.gov

Tip 2: Adopt RE-Ready Habits

Simply being aware of what appliances are in use, and what needs to be used and when, can help you adjust habits to minimize household energy use. Learn to read your electric meter so that you can see how much power you're using at any given time or how much energy was consumed over a period of time.

The most efficient practices are those that don't require any extra energy input, such as hanging clothes to dry on a clothesline. The next tier of efficiency is to install the most efficient technology and minimize use. For example, wash clothes in a front-loading washer with a high "modified energy factor" rating, dry for only a few minutes (or not at all) in the clothes dryer, and hang until completely dry. Take advantage of passive cooling techniques to minimize or even eliminate the need for air conditioning. In many climates, opening the windows at night and closing windows and shades in the morning to keep the sun out, along with using ceiling or floor fans, can be an effective cooling strategy.

Point-of-use energy monitors allow you to determine which of your appliances are efficient, and which of them aren't. In addition, whole-house electric energy monitors can conveniently report instantaneous and daily kilowatt-hour consumption via a handy display. Both are excellent tools to help put electric use into perspective and will help you track your overall reduction efforts. However, you probably already have a meter provided by the electric company that can also give you useful information (many will display both instantaneous power and total energy)—you just need to read it.



Point-of-use energy monitor.

Electric appliances also can account for a sizable portion of your overall energy consumption and have a large impact on a renewable electricity system's size and cost. For 120-volt electrical appliances, measuring energy use with a digital power meter, such as the Brand Electronics, Watts Up?, or Kill A Watt, will help you determine actual consumption and prioritize which appliances need to be replaced with more efficient units (see Access).



INEXPENSIVE ENERGY FIXES

Tip 3: Take Control

Lowering the thermostat is one sure way to reduce heating costs. On average, you can expect to save about 2% of the energy you use to heat (or cool) your home for every degree you lower (or raise) the temperature setting. Use a programmable thermostat and set it to lower the temperature 10°F when you're sleeping or away from home—or if there's no danger of pipes freezing, you can turn off your furnace completely. (And no, it will not take more energy to reheat the house than you saved by keeping the thermostat turned down.)



Wrap your water heater in an insulating blanket and set the temperature as low as possible. Typically, a 1°F adjustment in your water heater's temperature will result in a 1% change in energy use. You can use a timer to turn an electric water heater off when you don't need it, but you will gain more in efficiency by using conservation strategies such as low-flow showerheads

and insulating water heater tank wraps. If you'll be away for more than a few days, simply turn off your water heater entirely.

Timer controls and occupancy sensors work well on lights that tend to get left on, and multiple lighting circuits help put light only where you need it. Switched wall outlets or power strips allow you to turn things off (such as the entire entertainment center or office peripherals) with ease.

Call in the Energy Experts

Expert energy auditors can help you identify the best way to spend your energy improvement dollars. You can find such experts through your state's energy office, the Residential Energy Services Network, or the U.S. EPA's growing Home Performance with Energy Star program (see Access).

An energy auditor will examine every room in your home, using tools such as an infrared camera to check for insulation voids inside a wall or a "blower door" test to pinpoint air infiltration. A typical audit can take from two to four hours depending upon the tests performed, and auditors may charge a flat rate or by the hour. Always ask what specific tests they will perform, how they charge for services, what the cost will be, and how the results will be presented to you. An average home might save up to 30% on energy costs if all the auditor's recommendations are followed.

GOOD GADGETS & QUICK FIXES

Tip 4: Plug In to Power Strips

A "phantom load" occurs when an appliance that appears to be off still consumes some electricity. Examples include appliances with clocks or indicator lights, remote controls, and plug-in power adapters. Although a few watts of standby energy use per appliance may sound like small potatoes, the combined energy use of these small loads adds up fast. Phantom loads in a typical American household use about 1.2 kilowatt-hours per day—the equivalent of some superefficient off-grid whole-house PV systems! Make efficiency easy to practice by using switched outlets or power strips to control these loads and make the switch on the strip easily accessible.



Tip 5: Bright Lighting

Wherever you can, replace incandescent bulbs with compact fluorescents (CFs). CFs provide the same level of lighting, at about one-quarter of the energy use of incandescents. Although their up-front cost is higher, their reduced energy use paired with their longevity translates into long-term energy and cost savings. Use compact fluorescent bulbs everywhere except inside your fridge, where the cold temperature, short on-times, and frequent on-and-off cycling will reduce the lifetime of the bulb and offer little savings. In the fridge, remove the 40-watt bulbs it probably came with and replace them with a single 15-watt (or lower) incandescent bulb.

For electricity-free lighting during the day in windowless or dark rooms, consider installing light tubes, which bring in natural light. (Skylights can serve the same function but may also bring in unwanted heat during certain seasons.) In areas where excess heat is not a concern, clear roofing panels can provide a fairly inexpensive solution to provide additional daylighting. My (unheated) garage, porch, and chicken coop each have a few clear roofing panels that really brighten these areas during the day.



Courtesy: Solatube



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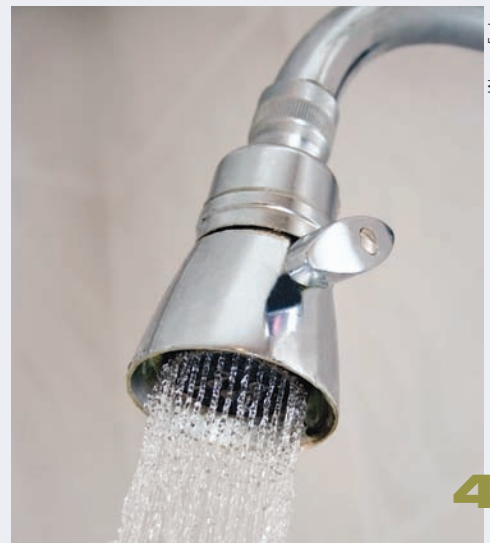
Tip 6: Seal Leaks & Deal with Ducts

Similar to appliances and electricity, the tighter your home, the less fuel you'll need to keep it warm. Start by identifying and sealing air leaks, which can be found around chimneys, window frames, the top of the foundation walls where wood meets concrete, and plumbing and electrical chases. Sealing your home against air leaks is the most cost-effective improvement you can make to reduce heating and cooling consumption while increasing your home's comfort.

Unless they are properly designed, sealed against leaks, and well insulated, heating and cooling ducts can account for tremendous energy loss to the unconditioned spaces through which they travel, like attics and basements. If you have forced-air heating or cooling, be sure to seal and insulate ducts everywhere you can.

Tip 7: Go Low-Flow to Save on Heating

In most homes, heating water is second only to space conditioning in energy use. Low-flow showerheads and faucet aerators can help lower your household water consumption and water-heating demand. So can using only cold water for clothes washing and laundering only full loads. If you have a private water system, conserving water will also reduce your pumping energy requirements and the load on your septic system.



Wagner Furian

INVEST IN ENERGY EFFICIENCY

Tip 8: Improve Insulation

Take a look in your attic. Depending upon your climate, if there is less than 1 foot of insulation, it will be worthwhile to add more. Walls are a bit harder to examine. One trick to inspect wall insulation is to either find or make a small hole in the wall, and then poke a wooden skewer into the hole. By wiggling the skewer, you might be able to pull out a few fibers of insulation. This is also a quick way to determine the depth of the walls and, therefore, the thickness of the insulation.

Insulation won't work well if it's not properly installed. Avoid gaps and compressions, especially around plumbing pipes and electrical wiring, and be sure the insulation material is in contact with all sides of the cavity into which it is installed. The best time to add insulation to walls is when you're making other improvements or renovations. Make sure air leaks are sealed before adding insulation.



Courtesy Pella.com

Tip 9: Get New Views

Replacing older, single-pane windows with new double- or triple-glazed units can save energy if they are installed to include air-leakage control around the frame. However, you can get almost as much savings by adding storm windows as you can with new double-glazed windows, at a fraction of the cost. Again, pay close attention to air-sealing when improving older windows. When it comes time to buy new windows, pay more for more efficient units. Over the long-term, the up-front cost will pay for itself in efficiency gains and reduced energy use.



David Lewis

On Your Way to Renewables

With renewable energy, a little advanced planning can add up to significant savings. Here are two quick tips to get you on the right track:

✓ **Design right.** Whether you're building a new home or remodeling an old one, proper design and planning can offer savings once you're ready to install your RE systems. Orient additions or new buildings to true south and reconsider rooflines and gables that interfere with solar access. Provide an unobstructed south-facing roof surface that allows plenty of solar collection area.

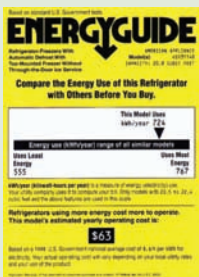
If you're planning to install a PV or SHW system, consider incorporating a chase between the roof and the basement to allow easy access and plenty of space for running cables and insulated plumbing. And don't forget to construct your roof to handle the additional weight of collectors, if necessary. Purchase a long-lasting roofing material too, and then, if you know what equipment you're planning to use, consider pre-installing rack stanchions before the new roof goes on.

✓ **Double up.** If you identify what you want ahead of time, you can piggyback projects with little or no extra cost. When we had some driveway work done, I had the backhoe and crew already on site dig trenches for conduit between my house and a future wind turbine site, as well as for piping between rain collection barrels. It took less than an hour of backhoe time for all that work and now I'm a step ahead on two future projects.

Tip 10: Seek the Star

Energy Star labels indicate a generally high level of efficiency for different classes of appliances, from dishwashers and refrigerators to furnaces and air conditioners. Qualifying products are compared to minimum federal efficiency standards, and savings vary by product. For example, Energy Star-labeled refrigerators must use at least 15% less energy than the current federal maximum allows.

While the Energy Star label helps you instantly identify more efficient products, be sure to compare energy use among labeled products by reviewing the yellow Energy Guide tag and choose the appliance that uses the least amount of energy in its class.



Courtesy www.eere.energy.gov

Access

Paul Scheckel is a senior energy analyst for the Vermont Energy Investment Corporation and author of *The Home Energy Diet* (New Society Publishers, 2005, www.nrgrev.com).

Digital Power Meters:

Brand Electronics • www.brandelectronics.com

Kill A Watt • www.p3international.com

Watts Up? • www.doublelead.com

Energy Efficiency & RE Incentive Information:

Database of State Incentives for Renewables & Efficiency • www.dsireusa.org

Energy Star • www.energystar.gov • Information on household energy efficiency and energy-efficient household appliances

Residential Energy Services Network (RESNET) • www.natresnet.org • Professional home energy raters directory

Tax Incentives Assistance Project (TIAP) • www.energytaxincentives.org

