How To Cut Your Electric Bills In Half
How to Cut Your ELECTRIC Bills in Half

Off The Grid News

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WHY ARE ELECTRICAL RATES INCREASING SO MUCH?

Hang on to your wallet. By 2016, four years from now, you could be paying up to 14% more for your electricity. That's because 8% of the nation's older power plants are about to be shut down by the EPA—and replacing that capacity will be costly. For the average American family, that's $121.66 they'll have to pay each month to keep their lights on. And that could be just the beginning. By 2020, it could be a lot more.

This past summer, the Environmental Protection Agency announced its new Cross-State Air Pollution Rule (CSAPR) that covers pollution emissions that drift into other states. By 2014, coal-fired plants must cut emissions of toxic mercury, smog-forming nitrogen, and soot-forming sulfur dioxide. (On December 30, 2011, there was a small reprieve—a federal appeals court temporarily suspended the new EPA rules from going into effect on January 1, 2012.) All the same, as nearly 68 of the country’s old coal-fired power plants face shutdown by 2016, consumers are looking at significant increases to their electric bill.

Electric utility companies have tended to behave as safe, reliable institutions for investor wealth, rather than adventurous dynamos of technological change. Consequently, they have kept many of their coal-fired generators around for a long time. So long, in fact, that 100 plants date from 1953 or earlier. At age 73, the oldest of them is the C. C. Perry K Steam Plant owned by Citizens Energy Group in Indianapolis, Indiana, which was built in August 1938. (Following the EPA rules announcement, Citizens Energy Corp announced in November that it would convert the Perry K plant to natural gas.)

At the end of 2010, 73% of all coal-fired generation capacity in the U.S. was 30 years or older. Power companies admit that they need to build new generation capacity and retire their “aging fleet.” However, they (and their shareholders) have long recognized...
the profits from keeping older plants and equipment operational as long as possible. That's because coal is very cheap.

The total estimated cost to run a “fossil steam” plant is 48 cents per kWh. Operating and maintaining older coal power plants is cheaper than building new power plants that must comply with EPA, state, and local regulations.

But aging power plants are only half the equation. Equally relevant to electricity cost is the old rule of supply and demand. Our demand for electricity is outpacing generation and transmission capacity.

**HOW MUCH ELECTRICITY DO AMERICANS USE?**

How much does the typical American household use? According to the DOE’s Energy Information Agency, the average residential usage is 11,496 kWh per year, or 958 kWh per month. While 958 kWh per month doesn’t seem like very much, the number of U.S. households increased from 103.2 million in the year 2000 to 114.8 million in 2010. That’s 11.6 million more households demanding electricity. Even though U.S. electricity consumption has managed to more or less stay within that monthly 950-1000 kWh range for decades, those 11.6 million new households consume a total of 11,020 million kWh of electricity monthly, or about 367.33 million kWh per day.

How does increased demand affect the little guy? As an example, let’s look at the Electric Reliability Commission of Texas (ERCOT). ERCOT is both the electric grid regulator and electricity market for most of Texas. While ERCOT is the smallest of the country’s electricity regulatory and distribution networks, it manages the biggest percentage of energy use compared to other states (12%). ERCOT also juggles the country’s third highest electricity demand by servicing the cities of Houston, San Antonio, and Dallas-Ft. Worth. Because it is isolated from the rest of the national grid system, it must make virtually all of its own electricity to meet expanding demand.

On August 31, 2000, ERCOT’s peak demand reached 57,606 megawatts (MW). On August 23, 2005, peak demand reached 60,274 MW—an increase of about 4.5%. In 2010, demand hit new records three times, from August 4 through August 16, when it
finally topped out at 64,805 MW. One year later, on August 3, 2011, peak use soared to 68,379 MW—a whopping 3.96% increase over the previous year and 18.5% since 2000.

What happens when demand finally outstrips capacity in a power grid like ERCOT? Rolling blackouts. Rolling blackouts eliminate demand until the system has shed enough load to safely begin shouldering demand again, which keeps generation units from overheating and being damaged. If rolling blackouts fail to control the overload, the entire grid faces a cascading failure—putting everyone in the dark. Texas faced this nightmare on February 2, 2011, when cold weather caused the shutdown of seven power plants. This failure dragged down 50 other power plants and shut down natural gas pumps supplying fuel to natural gas power turbines. About 7,000 megawatts disappeared in the dead of night. In just a matter of hours, in the dim morning of February 3, the price for electricity on the ERCOT spot market wholesale price shot from $50/megawatt hour (mWh) at 3:00 am to the 6:15 am high of $3000/mWh (the state-imposed wholesale cap price). In terms of household pricing, that’s going from 5¢/kWh to $30/kWh.

And remember that August 3 peak demand of 68,379 MW? The wholesale price hit $3,000, again. ERCOT spent the rest of August issuing warnings to conserve electricity to stave off more rolling blackouts. While the Public Utility Commission of Texas (PUCT) has price caps on electricity rates (as do other state PUCs), utility companies risk losing millions of dollars when demand outstrips supply and they are forced to sell electricity at a loss. With new generation sorely needed in the Lone Star state, the PUCT is considering whether to raise (or even eliminate) the wholesale price cap altogether.

How do wholesale price caps benefit consumers? Flash back to the California Energy Crisis of 2000. Hot weather, short supply, high demand, and no wholesale cap allowed ENRON to manipulate the California energy market by taking some of its power plants offline, as well as overschedule line transmission—what has become known as “gam-

By 2020, half of all U.S. households will have smart meters. Smart meters make it possible to charge consumers prices that vary with real-time system conditions.
ing the market.” Retail prices for consumers were capped, isolating consumers from higher energy costs. The fallout bankrupted power generation companies, laid off hundreds of workers, and threatened the reliability of electric power for everyone in California.

Many states now have modified electricity markets that protect utility companies from this scenario by passing on the cost to consumers. Professor Frank A. Wolak, former chair of the California Independent System Operator (ISO) Market Surveillance Committee (MSC), testified to California’s independent state oversight agency, the Little Hoover Commission, that “interval meters” (also known as “smart meters”) will record customer’s real-time usage and pricing. “This makes it possible to charge all consumers retail prices that vary with real-time system conditions, what is often referred to as dynamic pricing.”

The Edison Foundation estimates that approximately 65 million smart meters will be deployed by 2020, representing 50% of U.S. households.

Oh-oh.

YOU’LL HAVE TO BE PROACTIVE—OR FACE MAJOR STICKER SHOCK

Let’s backtrack to those impending coal plant shut downs. Currently, 45% (just under 2 trillion kWh) of US power is generated by coal. With 8% (about 14,700 megawatts) of the country’s electrical supply to be phased out due to extreme age or environmental noncompliance, there’s no getting around it. The nation’s electricity demand is going drive prices up.

How many old coal plants are in your area? Is your state using wholesale rate caps? How ready are you for real-time pricing? How much more are you willing to pay? $30/kWh?
ILLINOIS TECHNOLOGY COMPANY INTRODUCES DUAL-PURPOSE SOLAR GENERATOR

Now there’s a generator that requires no fuel other than sunlight. A solar generator from Solutions from Science can be used on a daily basis to reduce your electric bill … plus it provides instant backup power in any outage. There are 3 models to choose from, depending on your power needs.

- Completely silent
- No toxic fumes
- Easy set-up
- Maintenance-free
- Provides an endless supply of free electricity.

Here’s what our customers say:

“We have noticed that our electric bill has dropped by an average of $25 per month just using the generator for simple things.”
~ Nancy Thompson, Arizona

“I love it! I charge my laptop, charge my cell phone, and plug in my lamps every day... for free!”
~ Betsy M., Kentucky

FOR A FREE INFORMATION KIT, CALL TOLL-FREE.
1-877-327-0365
The best way to avoid owing your local energy utility big bucks is to cut how much electricity you use. Become more energy efficient. Change habits and structures that waste energy. By spending a few hours with some simple home improvements, you can save hundreds of dollars over time. Let’s walk through the math and start with a simple electricity cost of 10¢/kWh. You use 958 kWh/month (2010 national average). That’s a monthly bill of $95.80 and a yearly total of $1,149.60.

STAKING OUT THE ENERGY VAMPIRES

Let’s start with the obvious: if you’re not using it, turn it off. But there’s a small problem. The TVs, radios, stereos, home theatre systems, DVRs, computers, and the myriad of small appliances lurking in your home actually don’t stop consuming electricity when you turn them off.

Try this next time you go into your kitchen: see how many things have clocks built into them. Microwaves, stoves, range hoods, coffee makers, toaster ovens, and even toasters have digital clocks built into them. While all these clocks might provide some measure of convenience, they all suck a small amount of power coming into your house. It may not seem like much on the surface, but it adds up over time.

According to estimates by the Department of Energy, unplugging unused electrical appliances can save 10% off your electric bill. For example, an automatic coffee maker typically uses between 900-1200 watts when it is making coffee. Let’s say yours uses 1000 watts. Over the course of an hour of making coffee and keeping it hot, it uses 1000 watts (1 kilowatt/hour or 1 kWh). So, if you are paying about 10 cents/kWh, you are spending a dime to make your morning coffee. Over a year, that’s $36.50. But this coffee maker also has a built-in half-watt clock and timer running 24 hours a day. Over the course of a year, that convenience eats 4.3 kWh and adds 43 cents. Ok, it’s peanuts—but how many other appliance-mounted clocks have you got running in your home? Add a TV, home theater amplifiers, cable box, and more to the mix, and it all adds up.

One of the biggest energy vampires in your home is the power adapter. The power adapter takes household 110 volt AC current and converts into a lower voltage DC
current to power or charge up a multitude of electronics. One of the larger adapters is called the “Power brick” because it looks pretty much like...well, a brick. Power bricks are often used to power televisions, computer monitors, gaming consoles, computer network modems and switches, printers, telephone answering machines, electronic musical instruments, laptop computers, sewing machines, and home medical equipment such as CPAP and BiPAP machines. Because they typically operate in standby mode to convert current and voltage, they are always on. Some smaller power bricks, like the ubiquitous and cheap “wall wart” used to charge cell phone and other gadget batteries, leak power through their circuitry. Unless they are connected to a power strip with an On/Off switch that physically cuts the household current connection, these power adapters are always sucking power from your wall, milliwatt by milliwatt. One jolting statistic from 2002 states that “more than 6% of national electricity consumption passes through power supplies—some 217 billion kWh of electricity per year worth about $17 billion.

Another poorly understood energy vampire is called “sleep mode”. Computers, printers, monitors, flat panel TVs, network storage devices, and other peripherals go into a low-energy standby mode after a pre-set period of inactivity. Many consumers don’t realize that sleep mode means these machines are still on and using power. Lawrence Berkeley National Laboratories lists that average sleep mode power consumption for a desktop computer is 21.23 watts. So, if you like to leave your computer in sleep mode because it takes too long to start, remember that you are burning 21.13 watts/hour. (Most current computers show an average start up time of less than one minute. Longer start-up times are associated with older computers or computers with virus problems.) Over a 24-hour period, that’s 507 watts. In 30 days, that’s 15 kWh and in a year, that’s 182 kWh or $18.20 (assuming 10 cents/kWh). Plus, for at least one-third of that time, you will not be using the computer because you are asleep. The U.S. Department of Energy recommends turning off your monitor if you are not going to use it for more than 20 minutes and...
that if you are going to be away from your computer for 2 hours or more, then you should shut down both your computer and monitor. If they are plugged into a power strip, that should be turned off too.

Unfortunately, constantly plugging and unplugging adapters and power cords to control vampire power draining is inconvenient. Fortunately, these suckers can be controlled with auto-switching smart power strips. Some smart power strips (used mainly in office settings) function through motion sensors that detect when someone is in the room before turning on outlets.

Most consumer-grade smart power strips are equipped with current sensors that monitor a master plug for current use. If this plug has something plugged into it, such as a TV or a computer monitor, and that device is turned on, then the strip will turn on the other outlets in the strip to power anything plugged into them. When the device plugged into the master device goes into stand-by mode or is switched off, the power strip will detect the fall in current and shut off the other plugs as well.

The trick to saving money by using smart power strips is to be smart about what you select for your master plug device. For example, if you plug in a TV set for your master device and your home theatre sound system into the other outlets, you could save money if you use the sound system mainly with your TV. Of course, your savings won't be as much if you listen to music separately through your sound system than you do with your TV on. Again, it's all being smart about using a smart power strip.

Smart power strip prices vary from $15 to $40, with more sophisticated ones priced as high as $100. How much you save depends on how you use it. Let’s say, though, that you have one hooked to your home desktop computer system: computer, monitor, printer, modem, and an external USB hard drive. For simplicity’s sake, the computer and monitor together eat only 5 watts when turned off. The printer, modem, and USB drive use power bricks that eat 15 watts each. That adds up to 50 watts. Not much, right? But over a year that’s 175 kWh it burns up just while you are asleep (assuming 8 hours/24 hour day). At 10 cents/kWh, that’s $17.50 you pay just to keep your computer system plugged into your wall.
THE BIG CHILL: A FRIDGE FULL OF SAVINGS

The king of the kitchen appliances is the refrigerator. Depending on their age, they account for 8%-20% of household energy use. From an energy using perspective, the modern fridge does more, but uses less energy, than older models. According to Energy Star, a pre-1993 vintage fridge costs more than $100 per year in electricity. That’s two times more than a new ENERGY STAR qualified model. Meanwhile, the steel behemoth fridges and freezers from the 1970s (those avocado or harvest-gold colored ones) that some folks keep in their basements as spares cost four times as much to run: $200 per year.

Of course, not everyone can afford a brand new Energy Star fridge right now. But there are a few tips that can shave a few dollars off the cost of running the one you have. First, ask yourself if it’s in the right place. Refrigerators should be located away from furnace ducts or other sources of heat. The reason is that they generate heat to keep your food cold. This waste heat is given off on their coils in the back of the fridge (or underneath in some models), and having hot air blown on them makes the fridge work harder to shed its own heat. Another thing is to make sure it is not crammed right up against the wall. Again, this is to allow air to circulate behind the fridge to permit the coils to cool. The last item is also very important to remember for your electronics, as well. Keep the...
bottom and rear of the fridge clean. Dust, dirt, and pet fur can block and coat the coils, making it hard for the fridge coils to cool. In the case of your computer systems, TV, and entertainment systems, circuit boards that get clogged with dirt retain a LOT of heat. Heat will damage IC chips, transistors, and other components, making them use more electricity and reducing their lifespan.

Inside the fridge, meanwhile, there’s even more to do. Clean the door gaskets regularly. Often dirt and dust collects, and prevents the gasket from sealing properly when the door closes. In time, mold and mildew will appear. Bad gaskets also let moisture-laden air inside, which forms ice in the freezer.

Obviously, standing in front of the fridge with the door open lets the cold air out. Instead of having to hunt for things, keep your fridge organized so that everyone in the family knows just where they can reach in and quickly grab things without having to hunt for them. In many newer models, there is a vent that can be blocked by containers. Keeping this vent clear will circulate cool air better. Also, since it’s easier to keep a large amount of stuff cold compared to just a few things, remember to keep your freezer as full as possible.

So far, in our ballpark cost-estimate of appliance clocks, computer systems, and refrigerator, we’re looking at $25.00 per year of electricity that you’re paying for needlessly. Even if you don’t buy a smart power strip (or even just a power strip) you can cut back on this usage by just unplugging things when you are done using them. Obviously, there are bigger areas in your home where energy efficiency can save you money. One of the best places to start is in your basement.

When is it cost effective to replace an older refrigerator? This handy online Refrigerator Retirement Savings Calculator will help you decide.

http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator
STEAMED UP BY HOT WATER COSTS

According to the DOE, up to 25% of the average home energy bill goes to heating water and keeping it warm. Assuming you are paying 10¢/kWh and using 958 kWh/month, 25% of $95.80 is $24.62 ($295 per year). If that seems expensive, well...that’s because it is.

The main reason is the heater itself. One of the most efficient ways to heat water is with an on-demand system that only heats water when it is needed. Unfortunately, these systems are expensive. The heaters alone retail for about $1,000 (although the prices are trending downwards). Most homes, however, are equipped with the cheaper, old-style, tank water heaters. The EIA’s 2009 survey on Residential Energy Consumption put the number of homes using storage tank water heaters at 108 million. In other words, most of the country still relies on storage tank water heaters. Nearly half are 10 years or older. However, data also shows that most homeowners are wasting energy by not using one of the simplest methods of cutting their energy costs. Only 14 million (about 12%) added water heater blankets to their water heater tanks.

The typical water heater tank holds 40 gallons and maintains that 40 gallons at a constant temperature, whether it is being used or not. For many folks, an 8-hour day at work and 8 hours of sleep means their water heater is keeping water hot for 16 hours a day when no one is home or active to use it. With this in mind, putting an insulating blanket on the water heater should be a no-brainer. It helps the tank stay warmer longer and saves energy. Adding foam insulation to hot water pipes for about ten feet from the water heater (the entire length is better) further reduces the amount of energy being eaten to keep the water hot. Why? Let’s say you have a 20-foot run of pipe from your water heater to your bathtub. Every morning, you
run the hot water and wait for 20 feet of cold water to flow through and go down the drain until you get hot water from your heater. If that run of pipe were insulated, you wouldn't waste all of that 20 feet of water because some of your water heater's energy would disperse through the water in that pipe and be warm. After your shower, it would stay warmer for longer too.

So how much does all this cost? An R-19 water heater blanket runs about $20, and foam pipe insulation costs between $1.25 to $2.00 per six foot section. For $25 (water heater blanket and 30 feet of pipe insulation), you'll start saving, on average, 25% from that $17.25 ($4.32/month; $51.84/year). You also won't need to run as much water while you wait to warm up your shower (trimming your water bill). You may also be able to turn down your heater's thermostat to 120º F. For every 10 degree reduction, you can save an additional 3%-5% on your heating cost. That's about $1/month, bringing your savings up to $52.84/year.

There are some safety rules when it comes to water heater blankets. Avoid blocking any of the control panels on the water heater. Do not put any insulation across the top of your water heater. The pressure relief valve and extension pipe should never be obstructed; be sure to cut a hole in the side of the blanket to accommodate the valve and the down pipe from the valve. If you have a gas water heater, these electrical savings don't apply, of course. Using a blanket on a gas water heater will give you negligible savings at best, since many areas of a gas water heater cannot be covered.

Water heater storage tanks last about 10 years, depending on local water quality, mineral composition, use, quality of the tank itself, and the location of the tank. Sometimes, they fail quietly by springing lots of leaks. Sometimes they simply quit. To be sure, they aren't fun to change and depending on your circumstances, they can be really expensive. If your water heater is over ten years old and showing signs of rust or corrosion, it might be a good time to begin looking for a new heater. A great place to get educated about the different kinds of water heaters is at the Department of Energy’s Energy Saver’s website:

LAUNDRY’S DIRTY LITTLE ENERGY SECRET

Let’s face it: cleaning clothes is a dirty business when it comes to energy use. Washing machines consume 90% of their energy by using hot water (dishwashers aren’t much better). However, washers do use electricity and that amount can vary by one-to-two hundred kWhs annually, depending on the make, model, and age of the washer. The other resource washers consume is water, and if you rely on a well, then your well pump could be working overtime to fill your washer. In either case, a high efficiency washer can help you trim both your water use and energy costs. According to Energy Star, replacing a 10-year-old washer with a new Energy Star model can decrease water use by 50% and energy use by 37%.

However, if you still plan to stick with your ol’ reliable, then here are some tips to help you get the most from your machine:

1. Wash in cold water. As mentioned, the biggest energy usage comes from hot water. Washing in cold water will save you money. Also, while powder detergent dissolves easiest in warm water, consider switching to liquid detergent, or mix up a pre-dissolved batch in a milk jug.
2. Leave the washer’s door open after use to dry out and prevent mold or mildew, especially in front-loading washers.
3. Keep your washer clean. Rinse out the washer every month with a cup of bleach. This will help remove sediment (as well as undissolved detergent and soap scum), and will help prevent mold and mildew.
4. Most importantly, always try to wash in full loads. The washer uses almost the same amount of kWhs, no matter how full it is.
Clothes dryers blow hot, dry air across clothing that is loosely tumbling inside a metal drum. Currently, there are no Energy Star rated dryers available. However, newer ones equipped with moisture sensors sound an alarm when the clothes are mostly dry, and this can save you some money. Most electric dryers use a 240-volt line: 120 volts to spin the motor and 120 volts to produce heat. They really eat a lot of electricity. A modern cubic-foot-capacity dryer can use 5,600 watts. Over an hour, that’s 5.6 kWh. Using your dryer for just three hours a week at 10 cents/kWh means that, over a year’s time, you are spending $87.36 to dry your clothes. That being said, there are things you can do to reduce your reliance on your clothes dryer and also keep it running as efficiently as possible.

One of the easiest things to do is to turn on your washing machine’s extra spin function. This will remove more water from the load and require less drying time. While dryers are convenient, they are hard on clothing fabric. Lint, for instance, is made up of cloth fibers that are rubbed or torn loose from your clothing as the load bumps and tumbles about in the dryer. Line drying your clothes will make them last longer.

What about wrinkles? A good trick is to tumble clothes in the drier for about five minutes until they warm up. This relaxes the cloth fibers. Afterwards, hang them on a clothesline to air dry. If the weather (or neighborhood association) won’t permit you to hang your washing outside, set up a line inside your home, such as in your basement or a hallway. Place a box fan so that it blows gently across the clothing. By doing this before you go to work or at night before you go to sleep, your clothes will be ready when you are. This will also add moisture to your home during the dry winter-heating months, save wear and tear on fabrics, and save on energy costs. How much can you save? Tumbling your clothes for just 5 minutes versus the typical 40 minutes will cut your cost by a factor of 8. So instead of $87.36/year, you will spend only around $10.92.

And don’t forget to clean the dryer. Not all lint and hair get caught in the dryer’s lint trap. Much of the finer fabric strands and dust blow through only to catch on folds of the dryer ductwork. This can build up in a short time, to the point where it constricts the duct or even blocks it completely. If the dryer can’t blow out the moist air from the laundry load, it will take longer for the clothes to dry. This can also be a fire hazard. It’s a good idea to disconnect the dryer vent hose about once a year and pull out as much
accumulated lint as you can reach with either your hand or a vacuum cleaner. You might be surprised what a difference this makes in your dryer’s performance.

AIR SEALING: SEAL IN THE SAVINGS

Air sealing refers to two important areas that commonly add to a home’s energy cost. The first one involves the concept of seeing your home in terms of a “thermal envelope,” which we’ll get back to. The second is about getting the most out of your heating, ventilation, and air-conditioning system (HVAC). Twenty years ago, these systems were simpler than they are today, consisting of an on switch, a relay, a filter, and a piece of rubber tubing to drain the condensed water from the air conditioner. Nowadays, they are highly sophisticated electronics driven by microprocessors. Yet, despite these advances, heating and cooling still eats up to half of all home utility bills.

The most important and easiest improvement to your HVAC system is to replace the filter regularly. Naturally, the rate will vary from home to home, depending on the circumstances. Pet dander, local weather and dust, and activities in the home clog dust filters at different rates. A good way to determine if your filter needs to be replaced is to pull it out of its housing and hold it up to a light bulb. If you can’t see any light, then it needs replacing. An easier rule of thumb, though, is to replace the filter every month whether it needs it or not. The reason is pretty simple: the fan is pulling air from other parts of your house through the filter. If the filter is clogged with dust, less air will be pulled through and less air will be circulated through your home. In the winter, that’s less heated air circulating and you will use more energy heating your home. In the summer, that’s less cool air moving around and you will spend more energy cooling your home, all because the fan motor will need to work harder. In addition, the fan is also pulling unfiltered, dust-laden air through the small holes and other leaks in the fan housing.

If the ductwork leading from your HVAC is not insulated, consider either doing so yourself, or contracting a local HVAC company to do so. If your ductwork is the large rectangular sheet-metal type, you can insulate it with foil-faced foam board, foil-faced radiant barrier insulation, or fiberglass insulation. Just like hot water pipes, insulated
ductwork keeps the air passing through your furnace or air conditioner at its temperature longer.

Leaky ductwork is another common problem that increases your HVAC’s energy costs by 20%. Plugging the leaks will improve air circulation to rooms and make your home feel more comfortable. Both newer and older homes should have tight seals on all ductwork joints. Sometimes, as ductwork expands and contracts during the course of the year’s heating and cooling, it pulls itself apart at poorly connected joints. Consequently, cold or heated air spills out into an unoccupied space (such as an attic or crawl space), and the homeowner finds himself spending more and more money to heat and cool his home. The correct way to repair this is to reconnect the joint, using screws if possible. The joint should then be taped with foil-faced UL181 tape or duct mastic. Regular vinyl-faced duct tape maybe cheaper, but heat makes it rapidly dry out, lose adhesion, and fall apart.

Little holes in the ductwork from nail holes, bends, or corners are also very common. In older homes, it is not uncommon for air-return ducts to be made by sheet metal covering joist spaces. Often, wires or pipes pierce these return ducts. Each and every hole in the ductwork should be taped or caulked shut. Why? Let’s say you have 100 quarter-inch diameter holes scattered through your ductwork. Doesn’t sound like a big problem but it is. All those holes add up to a single hole with an area of 4.5 inches. Closing up all those holes will move more air through the vents into your living spaces. Air circulation will improve and the balance of the temperature in your home will even out. It’s worth the hassle; you’ll notice the benefits right away in how much more comfortable your home feels.

If you use natural gas or propane for your furnace, check your chimney or exhaust vents before the heating season for any blockage or obstructions. Modern condens-
ing gas furnaces are 95% efficient or better, so most of the heat is transferred. So little heat remains in the flue gases that a fan is used to drive them from the venting. Even a couple of dried leaves can slow flue gases in the vent pipe enough to stifle the furnace’s combustion chamber and wind up costing you more money.

As mentioned earlier, air sealing is easier to understand when you think of your house as a thermal envelope or barrier, with the attic space not being wholly inside this barrier and your roof acting as a heat/precipitation shield. By air sealing your house, you are able to better control the environment and bring down costs. According to the DOE, outside air leaking into a home “can account for 30 percent or more of a home’s heating and cooling costs and contribute to problems with moisture, noise, dust, and the entry of pollutants, insects, and rodents.” For air sealing to work best, you must plug up and seal as many drafts and leaks as you can find. One simple way to find them is to wet the back of your hand and feel along windows, doors, and other places where pipes enter or leave your home. Under no circumstances use this method around any electrical penetrations, outlets, or switches. If you want to check for drafts around these areas, use an open flame from a candle or lighter.

Doors and windows can be repaired with weather stripping, caulk, new window glazing, or plastic sheeting stapled over the outside. Holes and gaps for plumbing or wiring can be filled with expandable foam or caulk. Interestingly enough, the more drafts you seal, the easier it will be to find smaller ones because of the stack effect.

The stack effect is caused by a number of factors, including relative air pressure. Basically, as outside air is drawn into the confined space of a home, it will displace warmer, moister air higher up. The warmer the air in the house, the more it will push to get out if there is a cold draft it can pull in behind it. To see how this works, open a window all the way in an upper floor on a cold day, and then open a small window just a crack on the lower floor. You will feel a very strong rush of air from the small window.

Drafts lurk everywhere, feeding that stack effect. Some are happening out of sight, such as in your walls. An exhaustive explanation about other places in your home to look at is the DOE’s Building Energy Codes Program (BECP) “Air Leakage Guide” (available online: www.energycodes.gov/publications/resourceguides/packets/al_guide/EERE_Air_Leakage_Guide_WEB_File.pdf.)
A good way to help you track down air leakage is to have an energy audit done on your home. Professional energy auditors will examine your home to identify specific problems with your home, especially those that can cause mold and mildew. They also use thermal imaging cameras to see how heat is lost from your home, and blower door tests to determine how well sealed your home is.

In the meantime, there are certain common places in any home’s structure that allow outside air and moisture to get inside. A major area for gaps is at the top of the foundation wall where the wood framing meets the concrete. A piece of lumber called the “mudsill” (or “sill plate”) is bolted onto the concrete. All the framing joists rest on top of this mudsill. In newer houses, a foam gasket helps seal the mudsill to the foundation concrete and helps keep air out. On older homes, this gasket was made of a variety of materials and was used mainly to keep the mudsill dry, rather than seal against drafts entering the house. Some older homes had none at all. How much of a draft can this joint let in? Over its lifetime, a home shifts and settles, moving the foundation-mudsill joint. Consider that a half-inch gap running the length of a 40-foot wall is the equivalent of leaving a 4’ x 5’ window open all the time. Of course, not all gaps are as big as half an inch, but sealing the entire length of the mudsill around the entire house makes a noticeable and immediate improvement to the comfort of your home.

The easiest way to seal the mudsill is with a few cans of expandable foam (average cost: $6.00 each). Just keep the nozzle of the tube pressed up against the mudsill and squirt. Once you’ve done that, insulate the banding joist. The banding joist is the wooden board attached to the mudsill that directly faces the outside of the house. Since fiberglass insulation typically causes condensation problems, the best material for this job is sprayed-on expanding foam. However, EnergySavers.gov advises that rigid foam can be cut to fit instead. “Foam board insulation is commonly placed between the exterior finish (i.e., siding, brick) and the studs of exterior walls. To prevent air infiltration, you should place rigid insulation boards tightly together and seal the seams with tape or caulk.”

Many homes in the southern states have crawlspaces and not basements. All the same, air sealing the crawlspace makes a big difference in the comfort of your home. Even though the bare earth in your crawlspace hasn’t had rain fall on it since your home was
SLASH YOUR LIGHTING BILL BY 90%

These breakthrough LED light bulbs cast the same amount of light as 60-watt incandescent bulbs, but use just 10% of the energy. And they last up to 40 years!

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built, remember that water moves underground. Just by putting down plastic sheeting ($20-$30) as a vapor barrier in your crawl space will drastically reduce the humidity in your home and save you money on your air conditioning. Insulating your crawl space area will also help with electrical costs. However, never completely seal your crawl space. Ventilation is required to keep moisture pulled away from under the house, and unless you’ve had your crawl space area professionally finished with modern materials, you’ll be creating an environment that can cause structural damage to the house from deteriorating factors such as mold and termites.

VENT THE SUMMER HEAT

Your attic gets incredibly hot during the summer because the sun is shining on it. But some of that heat radiates into your home and makes you whole house hotter. By adding more ventilation to your attic, you can circulate the heated air out and have better cooling in your upstairs rooms. Lots of newer homes have ridge vents mounted along the peaks of their roofs. These vents run the length of the roof and let out hot air at the top of the roof. The good news is most roofs can be retro-fitted with ridge vents without replacing the entire roof.

BE A FAN OF FANS

Ceiling fans blades are pitched to spin the direction that most helps with heating or cooling. During the heating season, your ceiling fan should slowly spin counter-clockwise. This way, they blow warmed air trapped near the ceiling to the periphery of the room and pull cool air up from the floor in the center of the room. In the summer, this is reversed. In fact, a ceiling fan will allow you to raise the air conditioner thermostat setting by 4 degrees Fahrenheit with no reduction in comfort. Ceiling fans blow the warm air down into the center of the room and cool air is sucked up along the walls. This way, ceiling fans move the air and keep the air temperature evenly mixed throughout the room.
LIGHTEN UP YOUR LIGHTING

The incandescent light bulb was invented over 100 years ago and until now, has remained the standard. There was an uproar among consumers, however, when the Energy Independence Act of 2007 demanded higher efficiency from light bulbs. It didn’t outright ban incandescent bulbs, but it might as well have. Because incandescent bulbs are such energy wasters, it would be impossible for them to comply with the new standards. Only 10% of the energy consumed by an incandescent bulb is used to generate light; the rest is lost in heat. CFL (compact fluorescent light) bulbs came onto the scene to replace them, but consumers were unhappy with their performance, their light spectrum, and with their mercury toxicity. LED (light emitting diode) bulbs were developed soon after, and have turned out to be everything that CFLs were promised to be, but weren’t.

Switching to LED light bulbs can save you about $100 to $200 per year. They do cost more initially, but they last, literally, for decades. If upfront cost is a concern, start by installing them in your most frequently used fixtures. LED light bulbs have another upside too. They’re cool enough to touch, and won’t contribute heat to a room. This will help rooms to stay cooler in the hot summer months.

INSULATION: BLANKETING COSTS

By far, the most effective way to cut your energy costs is to add insulation to your home. EPA estimates that homeowners can typically save up to 20% of heating and cooling costs (or up to 10% of total energy costs) by air sealing their homes and adding insulation in attics, floors over crawl spaces, and accessible basement rim joists. Of course, depending
on your home, it can also be one of the most expensive improvements you might face. While insulation saves the most energy and money when the entire job is complete (the attic, for example), in practical terms, it doesn’t need to be done all at once. All that’s left is to determine how much you need and what type is best for your home. In attics, most homes in the U.S. should have an R-38 rating, or about 14 inches. (The R rating refers to how resistant a material is to heat transfer.) Homes in northern states with bitter winter cold will benefit from an R-60 (20 inches). While some may argue that’s a lot just to keep their home warm for half the year, remember that attic insulation also keeps an air conditioned house cooler too. In southern states, a radiant energy barrier goes a long way to reflecting radiant heat away from the living space and helps keep the home cool on the most torrid days. Reflective insulation looks like bubble-pack covered in aluminum foil. It can also be glued or taped to metal ductwork as an effective insulation.

Other kinds of insulation include rigid foam board, spray foam (ideal for new construction), fiberglass, cellulose (shredded newspaper treated with fire retardant), and most recently, recycled denim. Determine how much you need by calculating your attic space. If you can’t afford the whole job at once, begin insulating over the areas in your house that are used the most, such as the living area. Remember not to block soffit vents with insulation (they help ventilate the attic). Also, be sure to insulate your attic door as thoroughly as the rest of your attic. Neglecting to do so causes a thermal leak and can degrade your insulation’s performance by up to 40%. One important detail: attic trap doors are usually very narrow. Be sure to measure the width so you’ll know if the insulation rolls or bundles can fit through the door! Remember, if using insulation that has a vapor barrier (a thin sheet of polyethylene film, aluminum foil, or kraft paper), then the vapor barrier should be facing what home inspectors call the “warm-in-the-winter side of the house.” That means, for instance, that if you’re insulating your crawlspace or basement ceiling, the vapor barrier side should be against the overhead subflooring to be properly installed.

Now, let’s look at how much we’ve potentially saved. Using the duct sealing and duct insulation percentage (let’s say we’ve done a very good job), we’ve saved $257.52 (20%) off our starting annual electric bill. Add the air sealing and insulation to the entire house and we saved another 20% or $257.52. Add in our other efforts, and we’ve managed to shave off $675.44 so far from a $1287.55 year bill!
PAYING ATTENTION: USING MONITORING GIZMOS AND KEEPING CLEAN CAN CUT COSTS

Let’s face it, we’ve all bought into the idea of convenience in the home because it means there’s one less thing to worry or think about doing. Forty years ago, during the 1970s energy crisis, people knew they could save money by turning down their thermostats at night and then raising them when they got up. Many people gave up on the practice because it was just plain inconvenient to keep thinking about the thermostat, and they didn’t like waking up to a cold house.

Programmable thermostats now let you conveniently take charge of your thermostat. Most come with a minimum of four setting options; wake time, leave, return, and sleep. You can set the thermostat to begin heating your home an hour before you wake up, you can set it to run at a lower temperature when you leave for work, and then increase it again an hour before you return in the evening. Finally, you can have it drop the temperature when you go to sleep. In the summer, you can set it to save on your air conditioning as well. Basic units sell for about $25.00 and are easy for any homeowner to install. A programmable thermostat can save 10% off your yearly bill just by helping you set your thermostat back by 10 - 15 degrees. Plus, you don’t notice the change because you are either away or inactive.

Wouldn’t it be great to see drafts rather than feel for them? You can, with an infrared heat gun. Use it to find the cold spots in your house caused by gaps in insulation. Priced at about $50, these are simple hand-held gadgets that let you point and measure.

Another way to take charge of your energy is use energy monitoring gadgets. Currently, there are a number out on the market that let you monitor electrical use, either for your whole home or just at the single outlet level. Whole home monitoring systems typically use a set of sensors that attach to either your meter box or to the electrical mains inside your breaker box. These are interfaced to a device that stores the data and connects wirelessly to your home’s computer network system. You can then log on and access your usage data via your Internet web browser. A few companies offer complete monitoring services that let you keep track of what an individual circuit in your home is doing. Prices on whole-house systems run from $80 to $700 with a service plan.
An outlet-mounted energy monitor, meanwhile, plugs into a wall outlet and features an LED display and another socket for you to plug appliances and other electronics into. It measures their energy use and shows you how closely their performance matches their advertised ratings. For example, say you’ve been using the same window-mounted air conditioner for ten years. Is it still performing as well as its nameplate says, or is it starting to show its age? Just plug it into the outlet monitor and learn what the actual energy use is. Most of these display the kilowatt-hours used and help you calculate how much a particular device or appliance costs to use. You might find out that it’s time to buy a new unit. Energy monitors can be used to test anything you plug into a wall socket: washers, refrigerators, stoves, coffee makers, microwaves, TVs, and all those vampire energy suckers. By using one to see how your energy use adds up, you can tailor your use of things like smart power strips and your appliances to more efficiently cut your energy cost.

STOP SLAVING FOR YOUR ENERGY VAMPIRE

As you can see, cutting your electricity bills doesn’t have to mean shorter showers, cold rooms, or wearing sweaters all the time. It means learning how to use energy in a smart way and taking an active role in tracking your energy use. True, many of the ways to save money require buying insulation or more efficient appliances, but over time, the savings do add up. Adding insulation to your home, for example, might be one of the most expensive upgrades, yet the benefits can be felt immediately, both in terms of comfort and in the money you save with lower energy bills. Plus, this kind of upgrade works as a hedge against rising energy costs in the future.

Let’s use our example again of 10¢/kWh, with a monthly average use of 958 kWh. Your electricity bill is $95.80 (or $1149.60/year). Suppose then that you decide to spend $1,500 to seal and insulate your home ($500 for caulk, foam, hot water insulation, weather-stripping, etc and $1000 for attic insulation). You do the labor yourself. Let’s also say that you spend $100 on two smart power strips and that you implement the other practices talked about. You’ve spent $1,600 but you have also managed to cut $500 from your energy bill for the first year. Let’s also say you’re able to take a federal tax credit in 2012 for $500 (not yet enacted, but thought to be similar to the 2011 version). So, at the end of the year, your annual energy bill is $643.77, but you have spent
$600 for upgrades, which brings you to $1243.77. If you had done nothing, your energy bill would have been $1149.60 in 2012. But in 2013, you only pay $643.77 because you are using half as much energy as you were before.

Fast forward to 2016. Energy prices have shot up 14 percent, as expected. Your electricity now costs 11.4¢/kWh. Doesn’t sound like much? It adds up. Let’s say you have managed to trim your use down from 958kWh/month to only 450kWh. Your monthly bill is only $53.10 ($637.20/year). Had you done nothing, your monthly use of 958 kWh would now cost you $109.21 ($1,310.54/year). Instead, you’ve saved $56.11 a month and that’s $673.34 per year that you are not paying to a utility company.

Being proactive is the only way to cut your energy bills. Stop “plugging-in, turning on, and tuning out.” Stop being a zombie-slave to your home’s energy vampires. Start looking at your use critically, and get into the habit of asking: “Is anyone using this?” “Why is this thing plugged in?” “Where is this draft coming from?” Small, smart fixes now can lead to big savings down the road.
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