



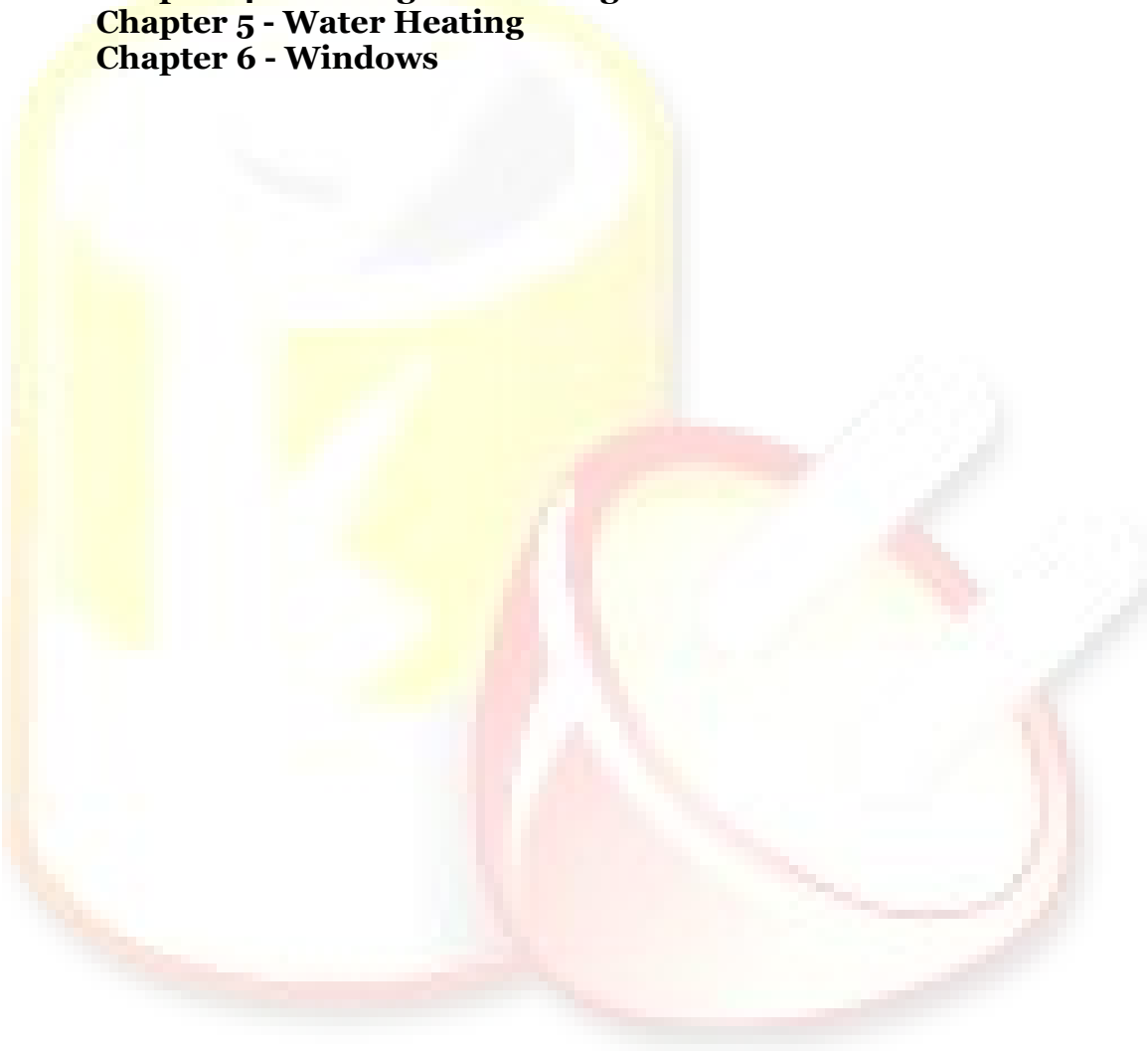
Everyday

# Energy Tips

Publisher, 2009

# Table of Contents

- Chapter 1 - Save Energy and Money Today**
- Chapter 2 - Your Home's Energy Use**
- Chapter 3 - Insulation and Sealing Air Leaks**
- Chapter 4 - Heating and Cooling**
- Chapter 5 - Water Heating**
- Chapter 6 - Windows**



# Save Energy and Money Today

## Tips to Save Energy Today

- Set your thermostat comfortably low in the winter and comfortably high in the summer. Install a programmable thermostat that is compatible with your heating system.
- Use compact fluorescent light bulbs.
- Air dry dishes instead of using your dishwasher's drying cycle.
- Turn off your computer and monitor when not in use.
- Plug home electronics, such as TVs and DVD players, into power strips; turn the power strips off when the equipment is not in use (TVs and DVDs in standby mode still use several watts of power).
- Lower the thermostat on your hot water heater to 120° F.
- Take short showers instead of baths.
- Wash only full loads of dishes and clothes.
- Look for the ENERGY STAR® label on home appliances and products. ENERGY STAR products meet strict efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy.

# **Your Home's Energy Use**

The first step to taking a whole house energy efficiency approach is to find out which parts of your house use the most energy. A home energy audit will pinpoint those areas and suggest the most effective measures for cutting your energy costs. You can conduct a simple home energy audit yourself, you can contact your local utility, or you can call an independent energy auditor for a more comprehensive examination. For more information about home energy audits, including free tools and calculators, visit [www.energysavers.gov](http://www.energysavers.gov) or [www.natresnet.org/resources/](http://www.natresnet.org/resources/)

## **Energy Auditing Tips**

- Check the insulation levels in your attic, exterior and basement walls, ceilings, floors, and crawl spaces. Visit [www.energysavers.gov](http://www.energysavers.gov) for instructions on checking your insulation levels.
- Check for holes or cracks around your walls, ceilings, windows, doors, light and plumbing fixtures, switches, and electrical outlets that can leak air into or out of your home.
- Check for open fireplace dampers.
- Make sure your appliances and heating and cooling systems are properly maintained. Check your owner's manuals for the recommended maintenance.
- Study your family's lighting needs and use patterns, paying special attention to high-use areas such as the living room, kitchen, and outside lighting. Look for ways to use lighting controls—like occupancy sensors, dimmers, or timers—to reduce lighting energy use, and replace standard (also called incandescent) light bulbs and fixtures with compact or standard fluorescent lamps.

## **Formulating Your Plan**

After you have identified where your home is losing energy, assign priorities by asking yourself a few important questions:

- How much money do you spend on energy?
- Where are your greatest energy losses?

- How long will it take for an investment in energy efficiency to pay for itself in energy cost savings?
- Do the energy saving measures provide additional benefits that are important to you (for example, increased comfort from installing double-paned, efficient windows)?
- How long do you plan to own your current home?
- Can you do the job yourself or will you need to hire a contractor?
- What is your budget and how much time do you have to spend on maintenance and repair?

### **How We Use Energy in Our Homes**

Heating accounts for the biggest chunk of a typical utility bill.

Once you assign priorities to your energy needs, you can form a whole house efficiency plan. Your plan will provide you with a strategy for making smart purchases and home improvements that maximize energy efficiency and save the most money.

Another option is to get the advice of a professional. Many utilities conduct energy audits for free or for a small charge. For a fee, a professional contractor will analyze how well your home's energy systems work together and compare the analysis to your utility bills. He or she will use a variety of equipment such as blower doors, infrared cameras, and surface thermometers to find leaks and drafts.

After gathering information about your home, the contractor or auditor will give you a list of recommendations for cost effective energy improvements and enhanced comfort and safety. A good contractor will also calculate the return on your investment in high efficiency equipment compared with standard equipment.

## **Tips for Finding a Contractor**

- Ask neighbors and friends for recommendations
- Look in the Yellow Pages
- Focus on local companies
- Look for licensed, insured contractors
- Get three bids with details in writing
- Ask about previous experience
- Check references
- Check with the Better Business Bureau

Checking your home's insulation is one of the fastest and most cost efficient ways to use a whole house approach to reduce energy waste and make the most of your energy dollars. A good insulating system includes a combination of products and construction techniques that protect a home from outside temperatures—hot and cold, protect it against air leaks, and control moisture. You can increase the comfort of your home while reducing your heating and cooling needs by up to 30% by investing just a few hundred dollars in proper insulation and sealing air leaks.

## **Insulation**

First, check the insulation in your attic, ceilings, exterior and basement walls, floors, and crawl spaces to see if it meets the levels recommended for your area. Insulation is measured in R-values—the higher the R-value, the better your walls and roof will resist the transfer of heat. DOE recommends ranges of R-values based on local heating and cooling costs and climate conditions in different areas of the nation. State and local codes in some parts of the country may require lower R-values than the DOE recommendations.

## **Where to Insulate**

Adding insulation in the areas shown below may be the best way to improve your home's energy efficiency.

**Crawl space**

**Basement**

**Attic**

**Walls**

**Floors**

For customized insulation recommendations, visit [energysavers.gov](http://energysavers.gov) and check out the Zip Code Insulation Calculator, which lists the most economic insulation levels for your new or existing home based on your zip code and other basic information about your home.

Although insulation can be made from a variety of materials, it usually comes in four types; each type has different characteristics.

Rolls and batts—or blankets—are flexible products made from mineral fibers, such as fiberglass and rock wool. They are available in widths suited to standard spacings of wall studs and attic or floor joists.

2x4 walls can hold R-13 or R-15 batts; 2x6 walls can have R-19 or R-21 products.

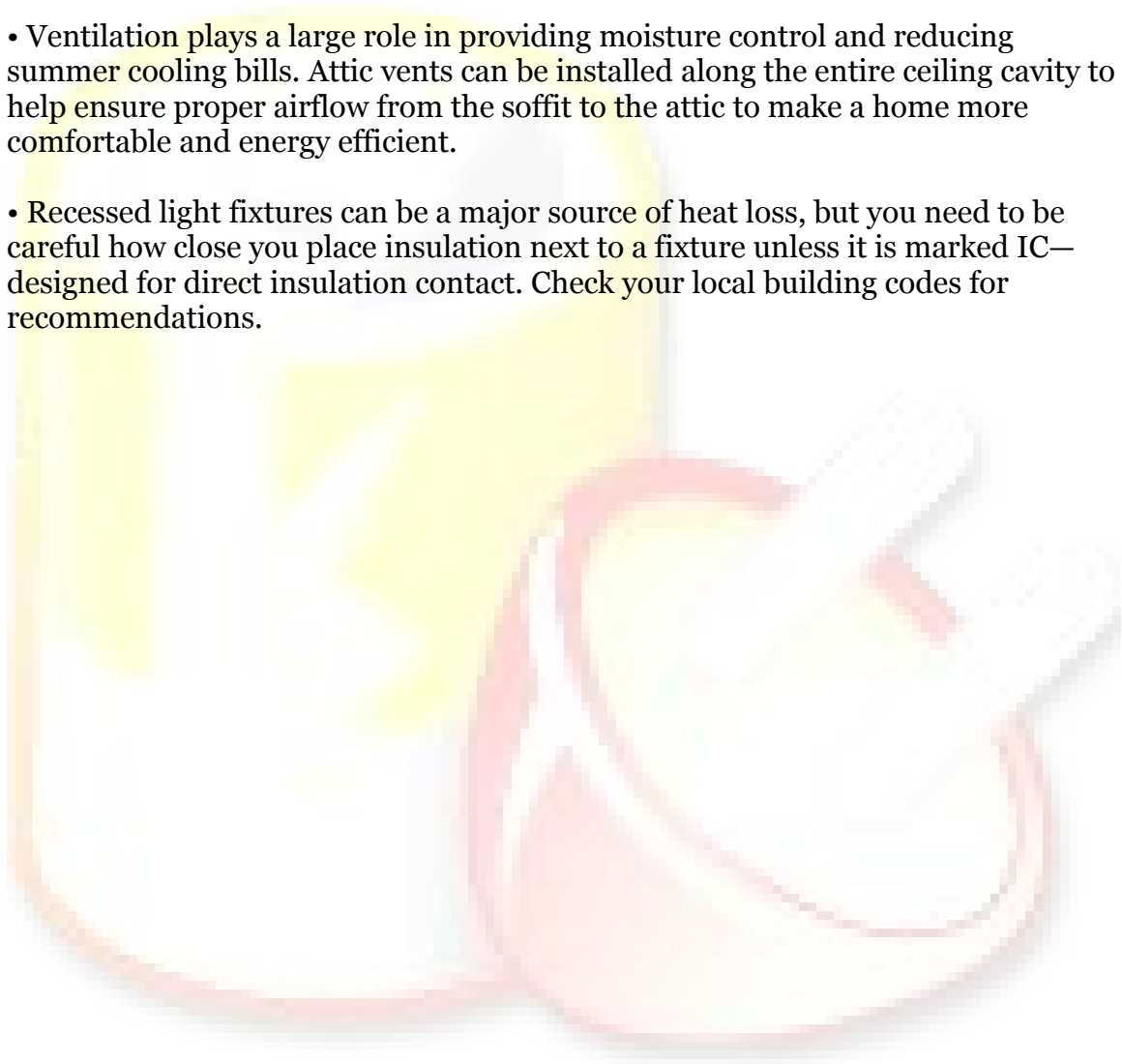
Loose-fill insulation—usually made of fiberglass, rock wool, or cellulose comes in shreds, granules, or nodules. These small particles should be blown into spaces using special pneumatic equipment. The blown-in material conforms readily to building cavities and attics. Therefore, loose-fill insulation is well suited for places where it is difficult to install other types of insulation.

Rigid foam insulation—foam insulation typically is more expensive than fiber insulation. But it's very effective in buildings with space limitations and where higher R-values are needed. Foam insulation R-values range from R-4 to R-6.5 per inch of thickness (2.54 cm), which is up to 2 times greater than most other insulating materials of the same thickness.

Foam-in-place insulation—can be blown into walls and reduces air leakage.

## Insulation Tips

- Consider factors such as your climate, building design, and budget when selecting insulation R-values for your home.
- Use higher density insulation, such as rigid foam boards, in cathedral ceilings and on exterior walls.
- Ventilation plays a large role in providing moisture control and reducing summer cooling bills. Attic vents can be installed along the entire ceiling cavity to help ensure proper airflow from the soffit to the attic to make a home more comfortable and energy efficient.
- Recessed light fixtures can be a major source of heat loss, but you need to be careful how close you place insulation next to a fixture unless it is marked IC—designed for direct insulation contact. Check your local building codes for recommendations.



# Insulation and Sealing Air Leaks

## Should I Insulate My Home?

The answer is probably “yes” if you:

- Have an older home and haven’t added insulation. Only 20% of homes built before 1980 are well insulated.
- Are uncomfortably cold in the winter or hot in the summer— adding insulation creates a more uniform temperature and increases comfort.
- Build a new home, addition, or install new siding or roofing.
- Pay high energy bills.
- Are bothered by noise from outside—insulation muffles sound.

## Long-Term Savings Tip

One of the most cost-effective ways to make your home more comfortable year-round is to add insulation to your attic. Adding insulation to the attic is relatively easy and very cost effective.

To find out if you have enough attic insulation, measure the thickness of the insulation. If it is less than R-22 (7 inches of fiber glass or rock wool or 6 inches of cellulose), you could probably benefit by adding more. Most U.S. homes should have between R-22 and R-49 insulation in the attic.

If your attic has enough insulation and your home still feels drafty and cold in the winter or too warm in the summer, chances are you need to add insulation to the exterior walls as well. This is a more expensive measure that usually requires a contractor, but it may be worth the cost if you live in a very hot or cold climate.

You may also need to add insulation to your crawl space. Either the walls of the crawl space or the floor above the crawl space should be insulated.

## How Much Insulation Does My Home Need?

## **New Construction**

For new construction or home additions, R-11 to R-28 insulation is recommended for exterior walls depending on location. To meet this recommendation, most homes and additions constructed with 2 in. x 4 in. walls require a combination of wall cavity insulation, such as batts and insulating sheathing or rigid foam boards. If you live in an area with an insulation recommendation that is greater than R-20, you may want to consider building with 2 in. x 6 in. framing instead of 2 in. x 4 in. framing to allow room for thicker wall cavity insulation—R-19 to R-21.

Today, new products are on the market that provide both insulation and structural support and should be considered for new home construction or additions. Structural insulated panels, known as SIPS, and masonry products like insulating concrete forms are among these. Some homebuilders are even using an old technique borrowed from the pioneers, building walls using straw bales. Check online at [www.energysavers.gov](http://www.energysavers.gov) for more information on structural insulation.

Radiant barriers (in hot climates), reflective insulation, and foundation insulation should all be considered for new home construction.

## **Sealing Air Leaks**

Warm air leaking into your home during the summer and out of your home during the winter can waste a lot of your energy dollars. One of the quickest dollar-saving tasks you can do is caulk, seal, and weatherstrip all seams, cracks, and openings to the outside. You can save 10% or more on your energy bill by reducing the air leaks in your home.

### **Tips for Finding And Sealing Air Leaks**

- First, test your home for air tightness. On a windy day, hold a lit incense stick next to your windows, doors, electrical boxes, plumbing fixtures, electrical outlets, ceiling fixtures, attic hatches, and other locations where there is a possible air path to the outside. If the smoke stream travels horizontally, you have located an air leak that may need caulking, sealing, or weatherstripping.

## **Sources of Air Leaks in Your Home**

Areas that leak air into and out of your home cost you lots of money.

Check the areas listed below.

Dropped ceiling  
Water heater and furnace flues  
Window frames  
Recessed light  
All ducts  
Electrical outlets and switches  
Attic entrance  
Door frames  
Plumbing and utility access  
Sill plates  
Chimney flashing

## **Insulation and Sealing Air Leaks**

- Caulk and weatherstrip doors and windows that leak air.
- Caulk and seal air leaks where plumbing, ducting, or electrical wiring penetrates through exterior walls, floors, ceilings, and soffits over cabinets.
- Install rubber gaskets behind outlet and switch plates on exterior walls.
- Look for dirty spots in your insulation, which often indicate holes where air leaks into and out of your house. You can seal the holes by stapling sheets of plastic over the holes and caulking the edges of the plastic.
- Install storm windows over single-pane windows or replace them with double pane windows.
- When the fireplace is not in use, keep the flue damper tightly closed. A chimney is designed specifically for smoke to escape, so until you close it, warm air escapes—24 hours a day!
- For new construction, reduce exterior wall leaks by either installing house wrap, taping the joints of exterior sheathing, or comprehensively caulking and sealing the exterior walls.

## **How and Where Does the Air Escape?**

- Plumbing penetrations 13%
- Windows 10%
- Floors, walls, and ceiling 31%
- Fireplace 14%
- Fans and vents 4%
- Doors 11%
- Ducts 15%
- Electric outlets 2%

Air infiltrates into and out of your home through every hole, nook, and cranny. About one-third of this air infiltrates through openings in your ceilings, walls, and floors.

## Heating and Cooling

Heating and cooling your home uses more energy and drains more energy dollars than any other system in your home. Typically, 61% of your utility bill goes for heating and cooling. What's more, heating and cooling systems in the United States together emit over a half billion tons of carbon dioxide into the atmosphere each year, adding to global warming. They also generate about 24% of the nation's sulfur dioxide and 12% of the nitrogen oxides, the chief ingredients in acid rain.

No matter what kind of heating, ventilation, and air-conditioning system you have in your house, you can save money and increase your comfort by properly maintaining and upgrading your equipment. But remember, an energy-efficient furnace alone will not have as great an impact on your energy bills as using the whole-house approach.

By combining proper equipment maintenance and upgrades with appropriate insulation, air sealing, and thermostat settings, you can cut your energy bills and your pollution output in half.

### Heating and Cooling Tips

- Set your thermostat as low as is comfortable in the winter and as high as is comfortable in the summer.
- Clean or replace filters on furnaces once a month or as needed.
- Clean warm-air registers, baseboard heaters, and radiators as needed; make sure they're not blocked by furniture, carpeting, or drapes.
- Bleed trapped air from hot-water radiators once or twice a season; if in doubt about how to perform this task, call a professional.
- Place heat-resistant radiator reflectors between exterior walls and the radiators.
- Turn off kitchen, bath, and other exhaust fans within 20 minutes after you are done cooking or bathing; when replacing exhaust fans, consider installing high-efficiency, low-noise models.
- During the heating season, keep the draperies and shades on your south facing windows open during the day to allow the sunlight to enter your home and closed at night to reduce the chill you may feel from cold windows.

- During the cooling season, keep the window coverings closed during the day to prevent solar gain.

## **Long-Term Savings Tips**

- Select energy-efficient products when you buy new heating and cooling equipment. Your contractor should be able to give you energy fact sheets for different types, models, and designs to help you.

### **Ducts**

One of the most important systems in your home, though it's hidden beneath your feet and over your head, may be wasting a lot of your energy dollars.

Your home's duct system, a branching network of tubes in the walls, floors, and ceilings, carries the air from your home's furnace and central air conditioner to each room. Ducts are made of sheet metal, fiber glass, or other materials. Unfortunately, many duct systems are poorly insulated or not insulated properly. Ducts that leak heated air into unheated spaces can add hundreds of dollars a year to your heating and cooling bills. Insulating ducts that are in unconditioned spaces is usually very cost effective. If you are buying a new duct system, consider one that comes with insulation already installed.

Sealing your ducts to prevent leaks is even more important if the ducts are located in an unconditioned area such as an attic or vented crawl space. If the supply ducts are leaking, heated or cooled air can be forced out unsealed joints and lost. In addition, unconditioned air can be drawn into return ducts through unsealed joints.

In the summer, hot attic air can be drawn in, increasing the load on the air conditioner. In the winter, your furnace will have to work longer to keep your house comfortable. Either way, your energy losses cost you money. Minor duct repairs are easy to do, Here are a few simple tips to help with minor duct repairs.

### **Duct Tips**

- Check your ducts for air leaks. First, look for sections that should be joined but have separated and then look for obvious holes.
- If you use tape to seal your ducts, avoid cloth-backed, rubber adhesive duct tape, which tends to fail quickly. Researchers recommend other products to seal ducts: mastic, butyl tape, foil tape, or other heat approved tapes. Look for tape with the Underwriters Laboratories logo.
- Remember that insulating ducts in the basement will make the basement colder. If both the ducts and the basement walls are

uninsulated, consider insulating both.\*

\* Note: Water pipes and drains in unconditioned spaces could freeze and burst in the space if the heat ducts are fully insulated, because there would be no heat source to prevent the space from freezing in cold weather. However, using an electric heating tape wrap on the pipes can prevent this.

- If your basement has been converted to a living area, install both supply and return registers in the basement rooms.
- Be sure a well-sealed vapor barrier exists on the outside of the insulation on cooling ducts to prevent moisture buildup.
- For new construction, consider placing ducts in conditioned space—space that is heated and cooled—instead of running ducts through unconditioned areas like the crawl space or attic, which is less efficient.

## Fireplaces

When you cozy up next to a crackling fire on a cold winter day, you probably don't realize that your fireplace is one of the most inefficient heat sources you can possibly use. It literally sends your energy dollars right up the chimney along with volumes of warm air. A roaring fire can exhaust as much as 24,000 cubic feet of air per hour to the outside, which must be replaced by cold air coming into the house from the outside. Your heating system must warm up this air, which is then exhausted through your chimney. If you use your conventional fireplace while your central heating system is on, these tips can help reduce energy losses.

### Fireplace Tips

- If you never use your fireplace, plug and seal the chimney flue.
- Keep your fireplace damper closed unless a fire is going. Keeping the damper open is like keeping a window wide open during the winter; it allows warm air to go right up the chimney.
- When you use the fireplace, reduce heat loss by opening dampers in the bottom of the firebox (if provided) or open the nearest window slightly—approximately 1 inch—and close doors leading into the room. Lower the thermostat setting to between 50° and 55°F.
- Install tempered glass doors and a heat-air exchange system that blows warmed air back into the room.

- Check the seal on the flue damper and make it as snug as possible.
- Add caulking around the fireplace hearth.
- Use grates made of C-shaped metal tubes to draw cool room air into the fireplace and circulate warm air back into the room.

## **Natural Gas and Oil Heating Systems**

If you plan to buy a new heating system, ask your local utility or state energy office for information about the latest technologies available to consumers. They can advise you about more efficient systems on the market today. For example, many newer models incorporate designs for burners and heat exchangers that result in higher efficiencies during operation and reduce heat loss when the equipment is off. Consider a sealed combustion furnace; they are both safer and more efficient.

### **Long-Term Savings Tip**

- Install a new energy-efficient furnace to save money over the long term. Look for the ENERGY STAR and EnergyGuide labels.

## **Programmable Thermostats**

You can save as much as 10% a year on your heating and cooling bills by simply turning your thermostat back 10% to 15% for 8 hours. You can do this automatically without sacrificing comfort by installing an automatic setback or programmable thermostat.

Using a programmable thermostat, you can adjust the times you turn on the heating or air-conditioning according to a pre-set schedule. As a result, the equipment doesn't operate as much when you are asleep or when the house or part of the house is not occupied.

Programmable thermostats can store and repeat multiple daily settings (six or more temperature settings a day) that you can manually override without affecting the rest of the daily or weekly program.

## **Landscaping**

Landscaping is a natural and beautiful way to keep your home cool in summer and reduce your energy bills. In addition to adding aesthetic value and environmental quality to your home, a well-placed tree, shrub, or vine can deliver effective shade, act as a windbreak, and reduce overall energy bills.

Carefully positioned trees can save up to 25% of a typical household's energy used for heating and cooling. Computer models from DOE predict that just three trees, properly placed around the house, can save an average household

between \$100 and \$250 in heating and cooling energy costs annually.

Studies conducted by Lawrence Berkeley National Laboratory found summer daytime air temperatures to be 3° to 6°F cooler in tree-shaded neighborhoods than in treeless areas.

The energy-conserving landscape strategies you should use for your home depend on the type of climate in which you live.



## Water Heating

Water heating is the third largest energy expense in your home. It typically accounts for about 16% of your utility bill. There are four ways to cut your water heating bills: use less hot water, turn down the thermostat on your water heater, insulate your water heater, or buy a new, more efficient water heater.

A family of four, each showering for 5 minutes a day, uses 700 gallons of water a week; this is enough for a 3-year supply of drinking water for one person. You can cut that amount in half simply by using low-flow aerating showerheads and faucets.

### Water Heating Tips

- Install aerating, low-flow faucets and showerheads.
- Repair leaky faucets promptly; a leaky faucet wastes gallons of water in a short period of time.
- Lower the thermostat on your water heater; water heaters sometimes come from the factory with high temperature settings, but a setting of 120°F provides comfortable hot water for most uses.
- Take more showers than baths. Bathing uses the most hot water in the average household. You use 15–25 gallons of hot water for a bath, but less than 10 gallons during a 5-minute shower.
- Insulate your electric hot-water storage tank, but be careful not to cover the thermostat. Follow the manufacturer's recommendations.
- Insulate your natural gas or oil hotwater storage tank, but be careful not to cover the water heater's top, bottom, thermostat, or burner compartment. Follow the manufacturer's recommendations; when in doubt, get professional help.
- Insulate the first 6 feet of the hot and cold water pipes connected to the water heater.
- If you are in the market for a new dishwasher or clothes washer, consider buying an efficient, water-saving model to reduce hot water use.

- Install heat traps on the hot and cold pipes at the water heater to prevent heat loss. Some new water heaters have built-in heat traps.
- Drain a quart of water from your water tank every 3 months to remove sediment that impedes heat transfer and lowers the efficiency of your heater. The type of water tank you have determines the steps to take, so follow the manufacturer's advice.
- Although most water heaters last 10– 15 years, it's best to start shopping for a new one if yours is more than 7 years old. Doing some research before your heater fails will enable you to select one that most appropriately meets your needs.

### **Long-Term Savings Tips**

- Buy a new energy-efficient water heater. While it may cost more initially than a standard water heater, the energy savings will continue during the lifetime of the appliance. If your current water heater is electric, consider switching to a natural gas water heater if gas is available.
- Consider installing a drain water waste heat recovery system. A recent DOE study showed energy savings of 25% to about 30% for water heating using such a system.
- Consider demand or tankless water heaters. Researchers have found savings can be as much as 34% compared with a standard electric storage tank water heater.

If you heat water with electricity, have high electric rates, and have an unshaded, south-facing location (such as a roof) on your property, consider installing a solar water heater. The solar units are environmentally friendly and can now be installed on your roof to blend with the architecture of your house. More than 1.5 million homes and businesses in the United States have invested in solar water heating systems, and surveys indicate over 94% of these customers consider the systems a good investment. Solar water heating systems are also good for the environment. Solar water heaters avoid the harmful greenhouse gas emissions associated with electricity production. During a 20- year period, one solar water heater can avoid over 50 tons of carbon dioxide emissions. When shopping for a solar water heater, look for systems certified by the Solar Rating and Certification Corporation or the Florida Solar Energy Center.

## Windows

Windows can be one of your home's most attractive features. Windows provide views, day lighting, ventilation, and solar heating in the winter.

Unfortunately, they can also account for 10% to 25% of your heating bill. During the summer, sunny windows make your air conditioner work two to three times harder. If you live in the Sun Belt, look into new solar control spectrally selective windows, which can cut the cooling load by more than half.

If your home has single-pane windows, as almost half of U.S. homes do, consider replacing them. New double pane windows with high-performance glass (e.g., low-e or spectrally selective) are available on the market. In colder climates, select windows that are gas filled with low emissivity (low-e) coatings on the glass to reduce heat loss. In warmer climates, select windows with spectrally selective coatings to reduce heat gain. If you are building a new home, you can offset some of the cost of installing more efficient windows because doing so allows you to buy smaller, less expensive heating and cooling equipment.

If you decide not to replace your windows, the simpler, less costly measures listed below can improve their performance.

### **Cold-Climate Window Tips**

- You can use a heavy-duty, clear plastic sheet on a frame or tape clear plastic film to the inside of your window frames during the cold winter months. Remember, the plastic must be sealed tightly to the frame to help reduce infiltration.
- Install tight-fitting, insulating window shades on windows that feel drafty after weatherizing.
- Close your curtains and shades at night; open them during the day.
- Keep windows on the south side of your house clean to let in the winter sun.
- Install exterior or interior storm windows; storm windows can reduce heat loss through the windows by 25% to 50%. Storm windows should have weather-stripping at all moveable joints; be made of strong, durable materials; and have interlocking or overlapping joints. Low-e storm windows save even more energy.
- Repair and weatherize your current storm windows, if necessary.

### **Warm-Climate Window Tips**

- Install white window shades, drapes, or blinds to reflect heat away from the house.
- Close curtains on south- and west facing windows during the day.
- Install awnings on south- and west facing windows.
- Apply sun-control or other reflective films on south-facing windows to reduce solar gain.

### **Long-Term Savings Tip**

- Installing new, high-performance windows will improve your home's energy performance. While it may take many years for new windows to pay off in energy savings, the benefits of added comfort and improved aesthetics and functionality may make the investment worth it to you. Today, many new window technologies are available that are worth considering. Glazing materials (the glass part of the window) now come with a variety of selective coatings and other features; frames are available in aluminum, wood, vinyl, fiber glass, or combinations of these materials. Each type of glazing material and frame has advantages and disadvantages.