compare energy usage. For furnaces, look for high Annual Fuel Utilization Efficiency (AFUE) ratings. The national minimum is 78% AFUE, but there are ENERGY STAR models on the market that exceed 90% AFUE.

- For air conditioners, look for a high Seasonal Energy Efficiency Ratio (SEER). The current minimum is 13 SEER for central air conditioners. ENERGY STAR models are 14 SEER or more.

Air 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, fiberglass, or other materials.

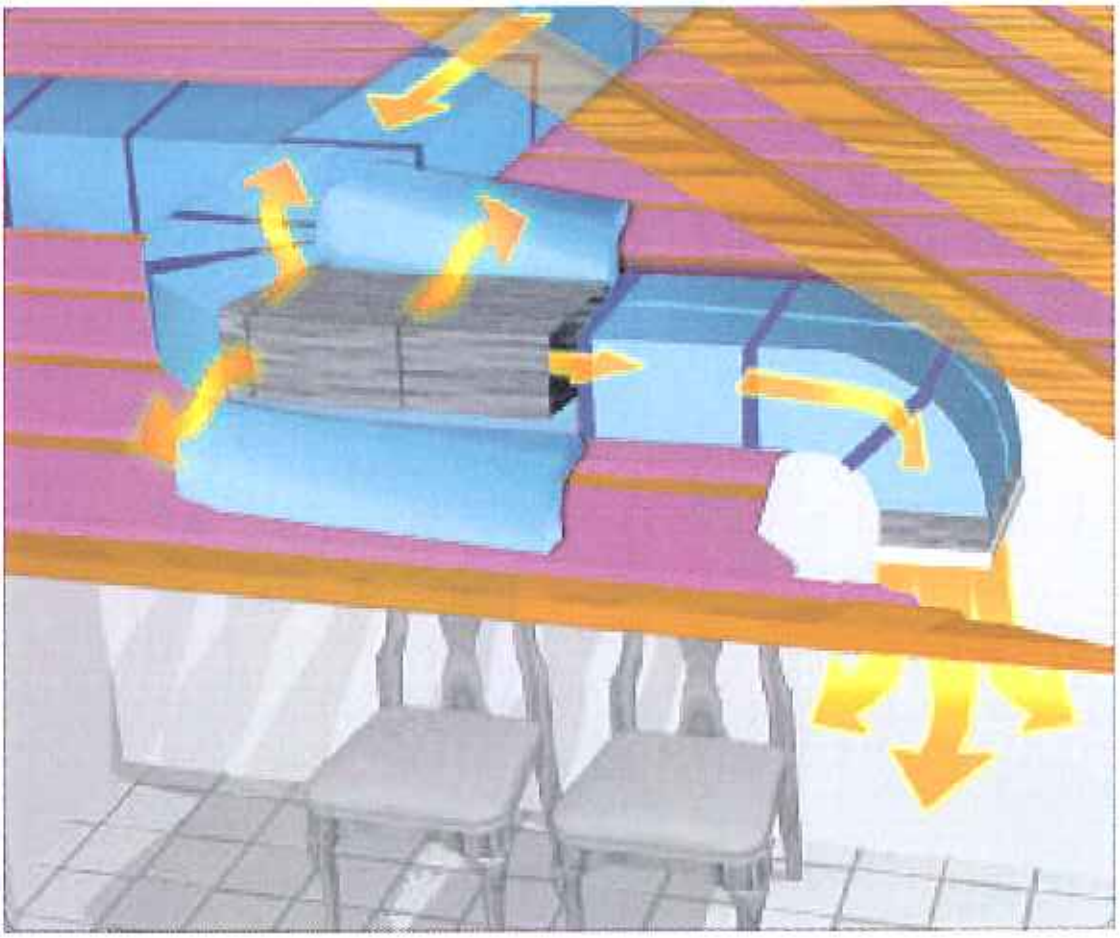
Unfortunately, many duct systems are poorly insulated or not insulated properly. Ducts that leak heated air into unheated spaces can add hundreds of dollars a year to your heating and cooling bills. Insulating ducts that are in unconditioned spaces is usually very cost effective. If you are buying a 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 of 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.

Although minor duct repairs are easy to make, ducts in unconditioned spaces should be sealed and insulated by qualified professionals using appropriate sealing materials. 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. 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. Check with a professional contractor.



Ducts—Out-of-Sight, Out-of-Mind
The unsealed ducts in your attic and crawlspaces lose air, and uninsulated ducts lose heat, wasting energy and money.

- If your basement has been converted to a living area, hire a professional to 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.
- When doing ductwork, be sure to get professional help. Changes and repairs to a duct system should always be performed by a qualified professional.
- Ducts that don't work properly can create serious, life-threatening carbon monoxide (CO) problems in the home. Install a CO monitor to alert you to harmful CO levels if you have a fuel-burning furnace, stove or other appliance, or an attached garage.

Install a Carbon Monoxide Detector

Carbon monoxide (CO) detectors are highly recommended in homes with fuel-burning appliances, such as natural gas furnaces, stoves, ovens, and water heaters, and fuel-burning space heaters. An alarm signals homeowners if CO reaches potentially dangerous levels.

$ Long-Term Savings Tip

- You can lose up to 60% of your heated air before it reaches the register if your ducts aren't insulated and travel through unheated spaces such as the attic or crawlspace. Get a qualified professional to help you insulate and repair ducts.

Heat Pumps

Heat pumps are the most efficient form of electric heating in moderate climates, providing three times more heating than the equivalent amount of energy they consume in electricity. There are three types of heat pumps: air-to-air, water source, and ground source. They collect heat from the air, water, or ground outside your home and concentrate it for use inside. Heat pumps do double duty as a central air conditioner. They can also cool your home by collecting the heat inside your house and effectively pumping it outside. A heat pump can trim the amount of electricity you use for heating by as much as 30% to 40%.

Heat Pump Tips

- Do not set back the heat pump's thermostat manually if it causes the electric resistance heating to come on. This type of heating, which is often used as a backup to the heat pump, is more expensive.
- Clean or change filters once a month or as needed, and maintain the system according to manufacturer's instructions.

$ Long-Term Savings Tip

- If you use electricity to heat your home and live in a moderate climate, consider installing an energy- efficient heat pump system.

Solar Heating and Cooling

Using passive solar design techniques to heat and cool your home can be both environmentally friendly and cost effective. Passive solar heating techniques include placing larger, insulated windows on south-facing walls and locating thermal mass, such as a concrete slab floor or a heat-absorbing wall, close to the windows. In many cases, your heating costs could be more than 50% lower than the cost of heating the same house that does not include passive solar design.

Passive solar design can also help reduce your cooling costs. Passive solar cooling techniques include carefully designed overhangs, windows with reflective coatings, and reflective coatings on exterior walls and the roof.

A passive solar house requires careful design and site orientation, which depend on the local climate. So, if you are considering passive solar design for new construction or a major remodeling, you should consult an architect familiar with passive solar techniques.

Solar Tips

- Keep all south-facing glass clean.
- Make sure that objects do not block the sunlight shining on concrete slab floors or heat-absorbing walls.

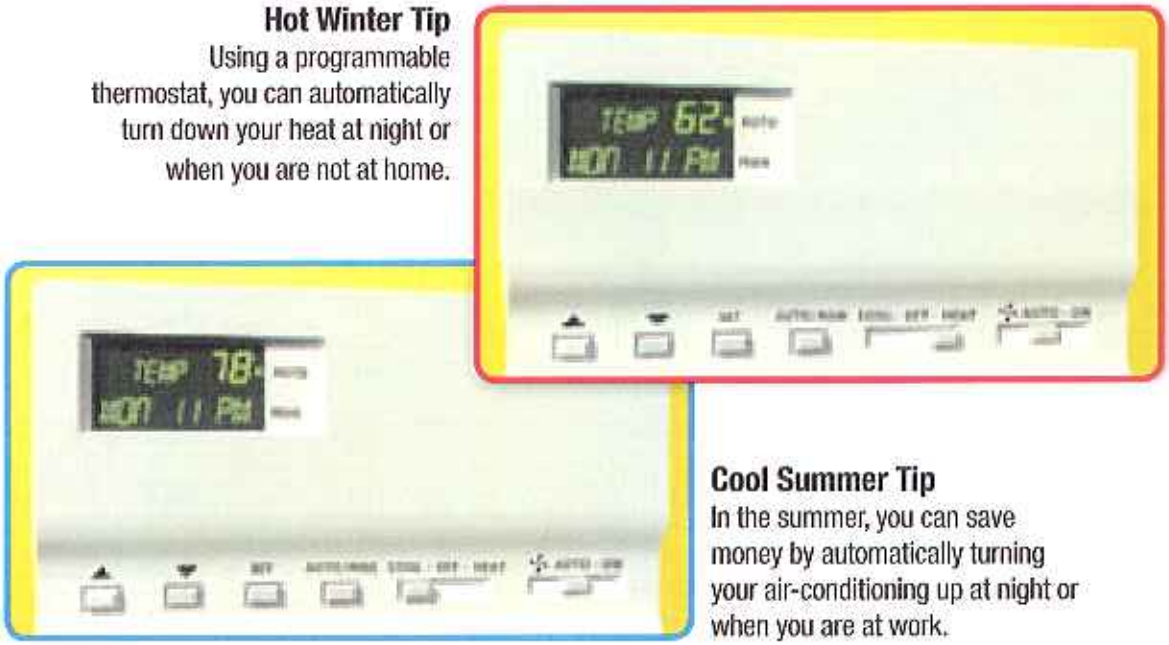
Natural Gas and Oil Heating

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. Check the shopping guide in the back of this booklet for additional information on how to understand heating system ratings.

$ 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.

Hot Winter Tip
Using a programmable thermostat, you can automatically turn down your heat at night or when you are not at home.



Cool Summer Tip
In the summer, you can save money by automatically turning your air-conditioning up at night or when you are at work.

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 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 preset schedule. As a result, the equipment doesn't operate as much when you are asleep or when the house, or a part of it, 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. When shopping for a programmable thermostat, be sure to look for the ENERGY STAR label.

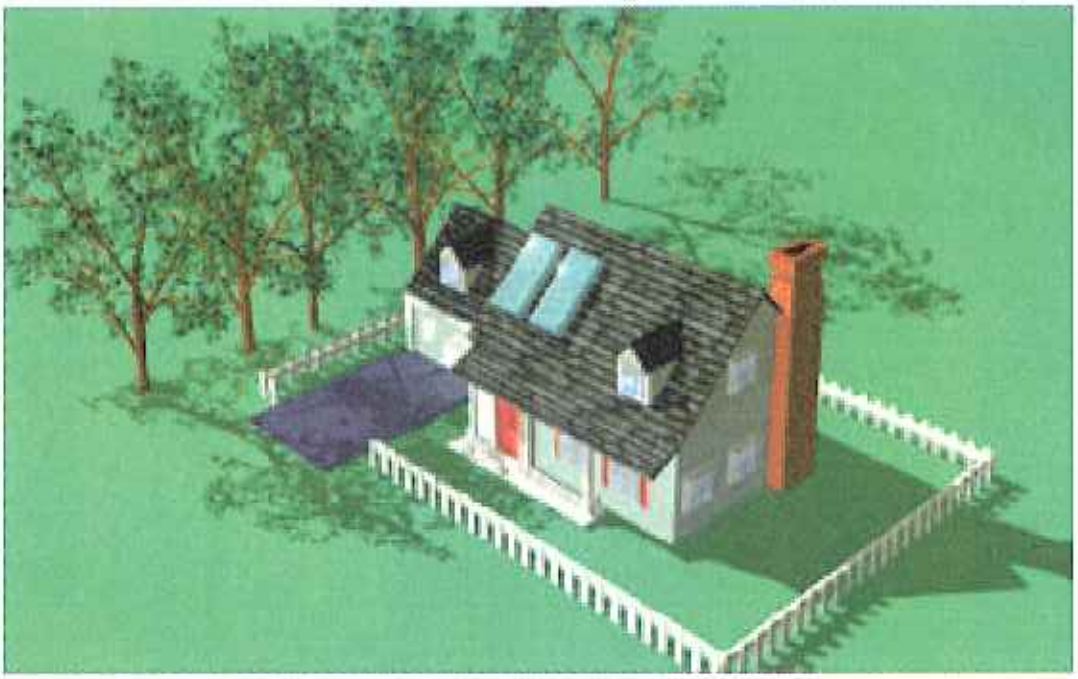
Air Conditioners

Buying a bigger room air-conditioning unit won't necessarily make you feel more comfortable during the hot summer months. In fact, a room air conditioner that's too big for the area it is supposed to cool will perform less efficiently and less effectively than a smaller, properly sized unit.

Sizing is equally important for central air-conditioning systems, which need to be sized by professionals. If you have a central air system in your home, set the fan to shut off at the same time as the cooling unit (compressor). In other words, don't use the system's central fan to provide circulation, but instead use circulating fans in individual rooms.

Cooling Tips

- Whole-house fans help cool your home by pulling cool air through the house and exhausting warm air through the attic.
- Set your thermostat as high as comfortably possible in the summer. The smaller the difference between the indoor and outdoor temperatures, the lower your overall cooling bill will be.
- Avoid setting your thermostat at a colder setting than normal when you turn on your air conditioner. It will not cool your home any faster and could result in excessive cooling and, therefore, unnecessary expense.



Buildings and Trees—Natural Partners
Deciduous trees planted on the south and west sides will help keep your house cool in the summer and allow sun to shine in the windows in the winter.

- Consider using an interior fan in conjunction with your window air conditioner to spread the cooled air more effectively through your home without greatly increasing your power use.
- Avoid placing lamps or TV sets near your air-conditioning thermostat. The thermostat senses heat from these appliances, which can cause the air conditioner to run longer than necessary.
- Plant trees or shrubs to shade air conditioning units but not to block the airflow. Place your room air conditioner on the north side of the house. A unit operating in the shade uses as much as 10% less electricity than the same one operating in the sun.

$ Long-Term Savings Tips

- If your air conditioner is old, consider purchasing a new, energy-efficient model. You could save up to 50% on your utility bill for cooling. Look for the ENERGY STAR and EnergyGuide labels. The shopping guide in the back of this booklet will help you find the right size unit for your needs.
- Consider installing a whole-house fan or evaporative cooler if appropriate for your climate. Check out www.energysavers.gov for more information on efficient cooling.

Landscaping

Landscaping is a natural and beautiful way to keep your home cool in summer and reduce your energy bills. A well-placed tree, shrub, or vine can deliver effective shade, act as a windbreak, and reduce your energy bills. Carefully positioned trees can save up to 25% of the energy a typical household uses for energy. Research shows that summer daytime air temperatures can be 3° to 6° cooler in tree-shaded neighborhoods than in treeless areas.

A lattice or trellis with climbing vines, or a planter box with trailing vines, shades the home's perimeter while admitting cooling breezes to the shaded area.

Water Heating

Water heating is the third largest energy expense in your home. It typically accounts for about 13%–17% 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 model.

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.
- 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 hot-water 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 ENERGY STAR model to reduce hot water use. See Appliances on page 22 for more information.

Keep Your Energy Bills Out of Hot Water
Insulate your water heater to save energy and money.

- 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 now 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. Look for the ENERGY STAR and EnergyGuide labels.
- Look for the ENERGY STAR label on efficient water heaters in the following categories: high efficiency gas non-condensing, gas condensing, electric heat pump, gas tankless, and solar.
- 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 natural gas on-demand or tankless water heaters. Researchers have found savings can be up to 30% compared with a standard natural gas storage tank water heater.
- Heat pump water heaters can be very cost-effective in some areas.

Solar Water Heaters

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 an ENERGY STAR qualified 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.

Activity	Gallons per Use
Clothes washing	32
Showering	20
Bathing	20
Automatic dishwashing	12
Preparing food	5
Hand dishwashing	4

Source: ACEEE

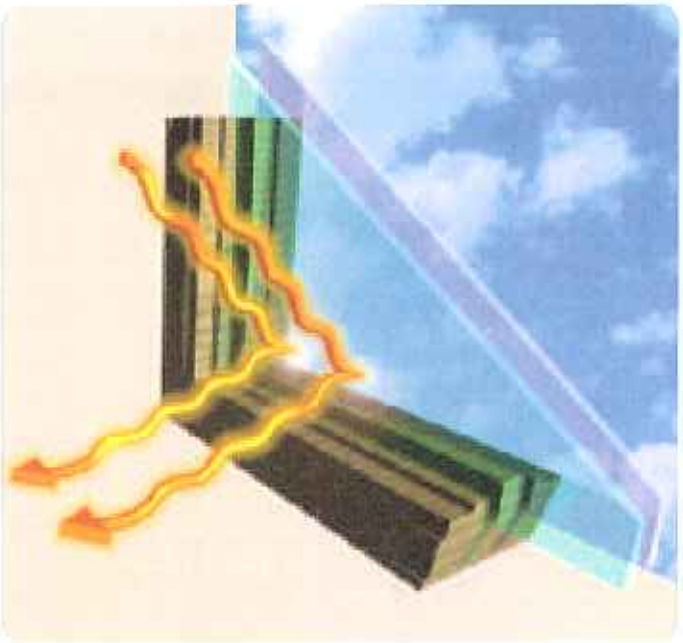
More than 1.5 million homes and businesses in the United States have invested in solar water heating systems, and surveys indicate that more than 94% of these customers consider the systems a good investment. Solar water heating systems are also good for the environment. Solar water heaters avoid the greenhouse gas emissions associated with electricity production. During a 20-year period, one solar water heater can avoid more than 50 tons of carbon dioxide emissions. When shopping for a solar water heater, look for the ENERGY STAR label and for systems certified by the Solar Rating and Certification Corporation or the Florida Solar Energy Center.

$ Long-Term Savings Tip

- Visit the Database of State Incentives for Renewables & Efficiency Web site (www.dsireusa.org) to see if you might qualify for tax credits or rebates for buying a solar water heater.

Windows

Windows can be one of your home's most attractive features. Windows provide views, daylighting, ventilation, and solar heating in the winter. Unfortunately, they can also account for 10% to 25% of your heating bill. During the summer, your air conditioner must work harder to cool hot air from sunny windows. Install ENERGY STAR windows and use curtains and shade to give your air conditioner and energy bill a break. If you live in the Sun Belt, look into low-e windows, which can cut the cooling load by 10% to 15%.



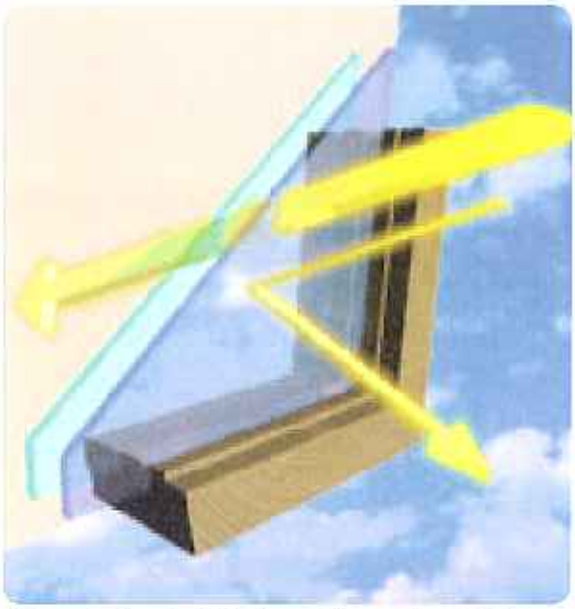
Cold-Climate Windows Keep Heat In
Double-pane windows with low-e coating on the glass reflect heat back into the room during the winter months.

If your home has single-pane windows, as many U.S. homes do, consider replacing them with new double-pane windows with high-performance glass (e.g., low-e or spectrally selective). 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 they allow you to buy smaller, less expensive heating and cooling equipment.

If you decide not to replace your windows, the simpler, less costly measures listed here 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 weatherstripping at all movable joints; be made of strong, durable materials; and have interlocking or overlapping joints. Low-e storm windows save even more energy.



Warm-Climate Windows Keep Heat Out
In the summertime, the sun shining through your windows heats up the room. Windows with low-e coatings on the glass reflect some of the sunlight, keeping your rooms cooler.

- 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, 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. Many window technologies are available that are worth considering.

Efficient windows may have two or more panes of glass, warm-edge spacers between the window panes, improved framing materials, and low-e coating(s), which are microscopically thin coatings that help keep heat inside during the winter and outside during the summer.

Shopping Tips for Windows

- Look for the ENERGY STAR label.
- Check with local utilities to see what rebates or other financial incentives are available for window replacement.
- High-performance windows have at least two panes of glass and a low-e (low emissivity) coating.
- Remember, the lower the U-factor, the better the insulation. In colder climates, focus on finding a low U-factor.
- Low solar heat gain coefficients (SHGCs) reduce heat gain. In warm climates, look for a low SHGC.
- In temperate climates with both heating and cooling seasons, select windows with both low U-factors and low SHGCs to maximize energy savings.
- Look for whole-unit U-factors and SHGCs, rather than center-of-glass, or COG, U-factors and SHGCs. Whole-unit numbers more accurately reflect the energy performance of the entire product.
- Have your windows installed by trained professionals. Be sure they're installed according to manufacturer's instructions; otherwise, your warranty may be void.

Lighting

Making improvements to your lighting is one of the fastest ways to cut your energy bills. An average household dedicates 10% of its energy budget to lighting. Using new lighting technologies can reduce lighting energy use in your home by 50% to 75%. Advances in lighting controls offer further energy savings by reducing the amount of time lights are on but not being used.

Compact Fluorescent Bulbs—A Bright Idea!

ENERGY STAR qualified lighting provides bright, warm light and uses about 75% less energy than standard lighting, produces 75% less heat, and lasts up to 10 times longer.

Indoor Lighting

Use linear fluorescent tubes and energy efficient compact fluorescent light bulbs (CFLs) in fixtures throughout your home to provide high-quality and high-efficiency lighting. Fluorescent lamps are much more efficient than incandescent (standard) bulbs and last about 6 to 12 times longer.

Today's CFLs offer brightness and color rendition that is comparable to incandescent bulbs. Although linear fluorescent and CFLs cost a bit more than incandescent bulbs initially, over their lifetime they are cheaper because of how little electricity they use. CFL lighting fixtures are now available that are compatible with dimmers and operate like incandescent fixtures.

Indoor Lighting Tips

- Be sure to buy ENERGY STAR qualified CFLs.
  - They will save you about $30 or more in electricity costs over each bulb's lifetime.
  - Producing about 75% less heat, they are safer to operate and can cut home cooling costs.
  - Visit www.energystar.gov to find the right light bulbs for your fixtures. They are available in sizes and shapes to fit in almost any fixture.
  - They provide the greatest savings in fixtures that are on for a long time each day. The best fixtures to use qualified CFLs in are usually found in your family and living rooms, kitchen, dining room, bedrooms, and outdoors.
- Consider purchasing ENERGY STAR qualified fixtures. They are available in many styles including table, desk and floor lamps — and hard-wired options for front porches, dining rooms, bathroom vanity fixtures, and more.

CFLs contain a very small amount of mercury sealed within the glass tubing. Many retailers are offering free recycling services for consumers at their stores.

ENERGY STAR qualified CFLs are available in sizes and shapes to fit in almost any fixture.

- ENERGY STAR qualified fixtures distribute light more efficiently and evenly than standard fixtures and they deliver convenient features such as dimming on some indoor models.
- Controls such as timers and photo cells save electricity by turning lights off when not in use. Dimmers save electricity when used to lower light levels. Be sure to select products that are compatible with CFL bulbs; not all products work with CFLs.
- When remodeling, look for recessed downlights, or "cans", that are rated for contact with insulation (IC rated).
- Take advantage of daylight by using light-colored, loose-weave curtains on your windows to allow daylight to penetrate the room while preserving privacy. Also, decorate with lighter colors that reflect daylight.
- If you have torchiere fixtures with halogen lamps, consider replacing them with compact fluorescent torchieres. Compact fluorescent torchieres use 60% to 80% less energy and do not get as hot as halogen torchieres.

Outdoor Lighting

Many homeowners use outdoor lighting for decoration and security. When shopping for outdoor lights, you will find a variety of products, from low-voltage pathway lighting to motion-detector floodlights. Light emitting diodes, or LEDs, thrive in outdoor environments because of their durability and performance in cold weather. Look for ENERGY STAR LED products such as pathway lights, step lights, and porch lights for outdoor use.

Outdoor Lighting Tips

- Because outdoor lights are usually left on a long time, using CFLs in these fixtures will save a lot of energy. Most bare spiral CFLs can be used in enclosed fixtures that protect them from the weather.
- CFLs are also available as flood lights. These models have been tested to withstand the rain and snow so they can be used in exposed fixtures. Most though, cannot be used with motion detectors.
- Look for ENERGY STAR qualified fixtures that are designed for outdoor use and come with features like automatic daylight shut-off and motion sensors.

LED—A New Kind of Light

Light emitting diodes, or LEDs, offer better light quality than incandescent bulbs, last 25 times as long, and use even less energy than CFLs. Look for ENERGY STAR qualified LED products at home improvement centers and lighting showrooms.

Appliances

Appliances account for about 17% of your household's energy consumption, with refrigerators, clothes washers, and clothes dryers at the top of the consumption list.

When you're shopping for appliances, think of two price tags. The first one covers the purchase price—think of it as a down payment. The second price tag is the cost of operating the appliance during its lifetime. You'll be paying on that second price tag every month with your utility bill for the next 10 to 20 years, depending on the appliance. Refrigerators last an average of 14 years; clothes washers about 11 years; dishwashers about 10 years; and room air conditioners last 9 years.

When you do shop for a new appliance, look for the ENERGY STAR label. ENERGY STAR products usually exceed minimum federal standards by a substantial amount. The appliance shopping guide on pages 27 and 28 lists some of the major appliances that carry the ENERGY STAR label and provides helpful information on what to look for when shopping for an appliance.

To help you figure out whether an appliance is energy efficient, the federal government requires most appliances to display the bright yellow and black EnergyGuide label. Although these labels will not tell you which appliance is the most efficient, they will tell you the annual energy consumption and operating cost for each appliance so you can compare them yourself. The American Council for an Energy-Efficient Economy lists the energy performance of top-rated energy- saving appliances on its web site: www.aceee.org.

Dishwashers

Most of the energy used by a dishwasher is for water heating. The EnergyGuide label estimates how much power is needed per year to run the appliance and to heat the water based on the yearly cost of natural gas and electric water heating.

What's the Real Cost?
Every appliance has two price tags—the purchase price and the operating cost. Consider both when buying a new appliance.