

ENERGY EFFICIENCY OVERVIEW

WHAT IS ENERGY EFFICIENCY?

Energy efficiency is managing the consumption of energy through the use of efficient technologies and wise behaviors. The choices we make and actions we take can make a difference in the quality of our lives and our environment. We can choose to conserve natural resources such as water, fossil fuels and minerals. We can take simple actions that reduce energy use, pollution and extend the life of our resource reserves. We can also use new technologies to light our homes, cook our food, and move us from one place to another in ways that reduce our impact on the environment and save money at the same time. The use of technologies to maintain our standard of living while using less energy and resources separates energy efficiency from conservation.

HOW TO USE THIS POSTER IN DIFFERENT SETTINGS

This poster is designed to be adaptable for different settings and circumstances. At the bottom of each panel, you will find ideas for improving the efficiency of your home, your school or workplace, and the community as a whole.



This poster was developed primarily for use by classroom teachers. At the elementary level, have students look for different ways to save energy, and to implement ideas at home. At the bottom of each panel, "Find It on the Front" ideas are given. At the upper elementary and secondary levels, encourage students to research topics further with the "To Learn More" topics on each panel, and to implement ideas at home and school. Consider forming an Energy Action Patrol or Watt Squad for interested students to become leaders in making your school more energy efficient. Patrol members educate on energy efficiency and conduct periodic audits.

In a business or community setting, display this poster in a lobby or other public area to reach as many people as possible. Encourage your coworkers to implement some of the efficiency strategies depicted on the poster front and described in these panels. Consider forming an Energy Action "E" Team or Watt Squad to evaluate your workplace and make recommendations for improvement.

Take Action to spread the energy wise word!

HOW DO WE USE ENERGY?

Energy is used for transportation, industry, to power schools and businesses, and to run our homes. When we think about our own energy use, we need to think not just of what we use at home, but at work and school, the energy embodied in the products we buy, and the energy that moves us. Transportation made up 28 percent of the energy used in the U.S. in 2012, making petroleum the energy source in highest demand.

FACT: Nonresidential buildings use up to 63 percent of the electricity in the United States. (Source: Environment Information Administration 2012, EIA Annual Energy Outlook.)

Take Action at Home: Contact your utility provider for an energy audit of your home.
Take Action at School or Work: Organize an Energy Action Team or Watt Squad to examine how energy is being used in your building and find ways to reduce waste. Are lights left on? Doors open? Computers left on?
Take Action in the Community: Support green businesses and products.
Find It on the Front: Find the government building, school and home. Find three modes of transportation.
To Learn More: Visit georgiapower.com/learningpower

TRANSPORTATION AND WATER

TRANSPORTATION

Not all modes of transportation are created equal. Obviously, walking and biking are the most energy efficient modes of transportation available to the average person. Use of mass transit is a good alternative for longer distances. If the use of a personal vehicle is unavoidable, there are ways to increase energy efficiency and reduce harmful emissions from vehicles.

- Carpooling and Ride Sharing** — The more people in the vehicle, the less emissions and fuel used per capita. Mass transit is the ultimate carpool!
- Combine Trips** — If you have three errands to run, do them all in one trip. This avoids the inefficient first few minutes of warming up the engine, and results in fewer total miles driven.
- Eat Locally** — Eating locally produced foods radically cuts down the fuel used to process, package and transport what we eat.
- Idling** — According to the California Energy Commission, every two minutes a vehicle idles uses the same amount of fuel as driving one mile. Contrary to popular belief, idling a car for 10 seconds uses more fuel than turning the car off and on. Modern engines do not require long warm-up periods. Thirty seconds is enough, even in winter. Driving is the best way to warm your engine.
- Maintenance** — Dirty air filters, not changing engine oil, low tire pressure and use of the incorrect type of tires waste millions of gallons of fuel a year.
- Driving Habits** — Obey speed limits, avoid sudden starts and aggressive driving, eliminate extra weight in the vehicle, and reduce air conditioning to increase mileage.
- Vehicle Choices** — Purchase an alternative fuel vehicle (AFV), such as a plug-in electric vehicle (PEV), hybrid or car that runs on biofuels or compressed natural gas (CNG). Alternative fuel vehicles produce less emissions than traditional petroleum use vehicles.



WATER

According to the U.S. Environmental Protection Agency, letting water run for five minutes uses as much energy as a 60 Watt light bulb left on for 14 hours. Conserve water and save energy at the same time.

- High efficiency shower heads, faucets, aerators, and toilets are readily available. Consider water consumption when buying washing machines and dishwashers, and only run them with full loads.
- Choose landscaping with low water needs. Consider xeriscaping and use native plants that are adapted to local water conditions.
- Use drip irrigation for landscape plants and water in the morning to reduce evaporation.
- Follow local water regulations for lawn watering. In general, you should only water the lawn to a depth of 1 inch (2.5 cm) per week. To find out how long to run the sprinkler, measure the amount of time it takes for a can to collect one inch (2.5 cm) of water when placed 3 feet (1 meter) from the sprinkler.
- Use rain barrels or other rainwater collection systems for irrigation water.



Take Action at Home: Have your vehicle regularly maintained and check the tire pressure often.
Take Action at School or Work: Walk, ride a bike or carpool. Make a no idle zone in front of the building.
Take Action in the Community: Find mass transit options in your community.
Find It on the Front: Find people walking, biking, using AFVs and mass transit. Find the community garden. Find the rainwater collection system.
To Learn More: Visit georgiapower.com/electricvehicles

WEATHERIZATION

WHAT IS WEATHERIZATION?

Weatherization is another name for weather proofing, the practice of protecting a building and its interior from the elements, and of modifying a building to reduce energy consumption and optimize energy efficiency. It includes sealing building openings, sealing duct work, providing proper ventilation of unheated or cooled spaces, proper insulation of the entire building, and the use of energy efficient doors and windows.

SEALING BUILDING OPENINGS

Doors, windows, pipes, and wiring that penetrate the exterior of a building are all locations where air can leak in or out of a building. Professional leak testing, called a blower door test, can find leaks quickly, and is the best way to check a building for air tightness. Most utilities offer this service, usually at no cost.

You can find major air leaks on your own, using a tissue paper or smoke. Hold the paper or smoke source next to doors, windows, pipes where they meet the wall, electrical outlets, light switches, etc. If the smoke or tissue paper moves horizontally, there is probably a leak. Dirty spots on attic insulation indicate a leak.



Leaks are sealed with caulk, weather-stripping and rubber gaskets. Weather-strip window openings and doors, caulk around window and door frames, caulk or use expanding foam insulation around pipes and electrical wiring openings, and place rubber gaskets behind electrical outlet and light switch plates to block leaks.

SEALING DUCT WORK

Leaks in duct work are very common, especially at junction boxes, where several ducts come together. Duct leakage can account for 25 percent of energy loss in a typical home. These leaks are very costly, since conditioned air is vented into attics, garages and between walls where it is not needed. Duct leaks cause rooms to feel warmer or cooler than they should, and may draw in dust, mold, and insulation fibers into occupied areas. They also cause humidity problems. The door blower and duct leakage tests can quickly find these leaks.

PROPER INSULATION

The insulating capacity of a material is measured by its R-value. The higher the R-value, the better the material will resist the transfer of heat. Most homes should have between R-30 and R-60 insulation in the attic. There are many types of insulation. **Rolls and batts (blankets)** are usually made of fiberglass or rock wool; **loose-fill** insulation may be fiberglass, rock wool, or cellulose fibers. It is blown into spaces and is great for areas that are hard to reach. **Rigid-foam** insulation is expensive, but has a higher R-value than other materials.

ENERGY EFFICIENT DOORS AND WINDOWS

Single-pane windows are generally inefficient. Double-paned (storm) windows and windows with "low-e" ratings significantly reduce energy consumption by buildings. Tinting may be used on east or west facing windows that are not well shaded. Doors should have a high R-value and may be further insulated by adding a storm door. Moisture on windows is a sign that windows are inefficient or are improperly caulked.

Take Action at Home: Conduct a leak test around windows and check weather-stripping on doors.
Take Action at School or Work: Check doors for gaps where light shows through, report problems found.
Take Action in the Community: Inform others about energy audits/weatherization programs in your area.
Find It on the Front: Find the worker doing the duct leakage test, find people adding insulation and caulking windows.
To Learn More: Explore eere.energy.gov/wip

DESIGNING FOR EFFICIENCY

ENERGY EFFICIENT DESIGN

There are many programs to assist in building energy efficiently. The most stringent program is Leadership in Energy and Environmental Design (LEED). The LEED Green Building Rating System promotes a whole-building approach to sustainability by addressing five areas: sustainable site development, water efficiency, energy efficiency, materials selection and indoor environmental quality. There are LEED certification programs for both homes and commercial buildings in the United States and Canada.

The U.S. Department of Environmental Protection's ENERGY STAR program has guidelines and an ENERGY STAR certification program for both homes and commercial buildings/schools focused strictly on energy efficiency. The U.S. Department of Energy has organized the Builder's Challenge, which provides climate specific guidelines for builders interested in meeting the increasing demand for energy-efficient buildings.



Third-party certification through either LEED or ENERGY STAR gives recognition for green building efforts and qualifies the building owners for a growing variety of government incentives.

ELEMENTS OF ENERGY EFFICIENT DESIGN

- Building Orientation** — The building should be designed to maximize day lighting and minimize heating and cooling needs. Windows on the south side of the building allow in day lighting, but may allow in too much heat in warmer climates. The building should be oriented to provide shading to reduce cooling loads and provide abundant day lighting to reduce electrical consumption and reduce cooling load due to heat given off by light bulbs.
- Adequate Insulation** — Recommended insulation values vary with climate. All of the certification programs mentioned above have climate-specific guidelines for insulation types and R-values.
- Efficient Windows** — Standard single-pane windows are inefficient, but double-pane windows with metal frames are not much better. Wood or vinyl-clad double-hung windows are recommended for all climate zones. Low-E coatings add additional energy efficiency. When shopping for windows, look for the U-factor, which measures thermal resistance. Get the windows with the lowest U-factor you can afford to keep heat from passing through windows.
- Duct Work** — Duct work has traditionally been in unconditioned attics, which are cold while you are trying to heat the building and hot when you are trying to cool it. Significant energy savings are easily accomplished by simply placing the duct work in the conditioned space.
- Caulking and Weather-stripping** — Ensuring a tight seal around doors, windows, pipes, and electrical switches and outlets is important to reduce heating and cooling needs.
- Fixtures and Appliances** — Use of ENERGY STAR qualified appliances, lighting fixtures and bulbs, and WaterSense faucets, shower heads and toilets are very important to achieving an efficient design. Use of motion sensors on lights is highly recommended.
- Building Materials** — Incorporating reused and recycled materials, and making sure that construction waste is recycled ensures that the building process itself is a model of efficiency.



Find It on the Front: Find the EarthCents building under construction, the man placing duct work in the living space, and spaces using day lighting.
To Learn More: Learn about LEED certification at the Green Building Council web sites. For the U.S., go to usgbc.org, and for the Canadian council, visit cagbc.org then click on the LEED button. Information on the Builders Challenge can be found on eere.energy.gov/buildings/challenge and the ENERGY STAR site at energystar.gov contains information on the certification program.

HEATING AND COOLING

PROPER HEATING, VENTILATING AND AIR CONDITIONING MAINTENANCE INCREASES EFFICIENCY

Changing filters on furnaces and central air and heating systems is very important. The unit must work much harder to push air through a dirty filter. A clean filter also prevents dirt and dust from building up inside the system, which can cause expensive breakdowns. Filters should be changed every one to three months, depending on the type of filter and how much the system is in use.

In addition to regular filter changes, annual checks are very helpful in keeping systems running at peak performance. It will reduce breakdowns and repair costs while extending the life of expensive equipment. Heating, Ventilating and Air Conditioning (HVAC) tune ups should include checking your thermostat, starting and shutting down the system to check the controls, lubricating parts, checking filters, tightening electrical connections, measuring current and voltage on motors and, for central air, checking the condensate line.

ADJUST THE THERMOSTAT

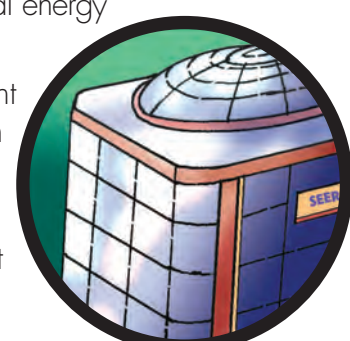
Setting the thermostat one degree higher in warm months, and one degree lower in the winter will save up to 3 percent on heating and cooling. For buildings that are unoccupied for several hours a day (or night) using a programmable thermostat can significantly improve energy efficiency. Choose a 7 day model if your daily schedule fluctuates, a 5+2 day model if you just need one schedule for weekdays and another for weekends, or a 5-1-1 model if you need different schedules for Saturdays and Sundays. To get the most out of a programmable thermostat, set it to adjust the temperature back at least 8 °F (4.5 °C) for heating while you are gone or sleeping. Program it to adjust the temperature up for cooling at those times, too.



ENERGY EFFICIENT HEATING AND COOLING SYSTEMS

Old, overloaded or improperly installed HVAC systems can be a major drain on energy bills. According to ENERGY STAR (energystar.gov), the following conditions mean it's time to look seriously at upgrading HVAC systems.

- Your equipment needs frequent repairs or is running more often than it used to. Aging equipment often becomes less efficient over time.
- Your heat pump or air conditioner is more than 10 years old. New high SEER (seasonal energy efficiency ratio) rated cooling units can save up to 20 percent on energy consumption.
- Your furnace or boiler is more than 15 years old. New furnaces are 15 percent more efficient than older models, and new boilers are 5 percent more efficient than ones from years past. Look for a high AFUE rating.
- Some rooms are too hot or too cold, or have humidity problems. Improper insulation or duct problems may be the cause of these problems, but equipment that is malfunctioning may also be to blame.



Geothermal, or geoechange, heat pumps are a very efficient method of providing a building with heating, cooling and water heating. Geothermal uses the earth's stable temperature to serve as a heat exchanger. In the summer, the ground is cooler than the air inside; while in winter the ground is warmer.

Whatever system you choose, make sure it is properly installed to maximize its efficiency.

Take Action at Home: Have your HVAC system evaluated for energy efficiency by a professional.
Take Action at School or Work: If you have a thermostat in your work space, adjust it.
Take Action in the Community: Tell people you know about ENERGY STAR products.
Find It on the Front: Find the SEER 15 heat pump and the geoechange heating and cooling system.
To Learn More: Take the Home Energy Yardstick test at energystar.gov and check out their heating and cooling guide. Visit georgiapower.com/learningpower

ACTION CHECKLIST

HOW TO DO A SIMPLE ENERGY AUDIT

Your utility company or an energy audit specialist can conduct a thorough audit of your home or workplace and find problems with the building and equipment such as furnaces and chillers. This will eliminate waste from mechanical sources, but will not combat problems resulting from the inefficient way we use our buildings. Changing behaviors takes repeated reminders, but can result in great improvements in efficiency. Use the checklists below as a starting place to conduct your own energy audit of your home, school or workplace.

CHECKLIST FOR SCHOOLS

- ___ Door and windows closed
- ___ Classroom lights off
- ___ Bathroom/vestibule lights off
- ___ Water off
- ___ Projector off
- ___ Document camera off
- ___ TV off
- ___ Classroom audio/CD player off
- ___ Computer monitors use energy settings (screen should go black, not to a screen saver)
- ___ Computer CPUs off at the end of the day
- ___ Computer peripherals off at the end of the day (printer, speaker, etc.)
- ___ Paper being recycled
- ___ All electronics unplugged before leaving for fall, winter, spring and summer breaks
- ___ Other _____

CHECKLIST FOR HOMES AND OFFICES

- ___ Lights off (do not rely on sensors if you know you will be gone a while)
- ___ TV off
- ___ Fans off
- ___ Music player off
- ___ Computer monitors use energy settings (screen should go black, not to a screen saver)
- ___ Computer CPUs off at the end of the day
- ___ Computer peripherals off at the end of the day (monitor, printer, speakers, etc.)
- ___ Using natural light where possible
- ___ Participating in recycling
- ___ Doors and windows closed
- ___ All electronics unplugged before leaving for vacations
- ___ Unplug cell phone chargers when not in use
- ___ Other _____



Take Action at Home: Perform an energy audit of your home using the checklist above.
Take Action at School or Work: Form an Energy Action Patrol or "E" Team to conduct periodic checks of your building. Report your findings to administration.
Take Action in the Community: Share the information from this poster with other people.
Find It on the Front: Find three actions you can take right now to put Energy Efficiency in Action.
To Learn More: Visit NEF1.org, georgiapower.com/learningpower

LIGHTING AND APPLIANCES

LIGHTING

Energy efficient lighting offers many benefits: cost savings, improved safety, enhanced comfort and increased durability compared to traditional incandescent lighting. Look for ENERGY STAR labeled bulbs and light fixtures. Energy efficient lighting includes compact fluorescent lamps (CFLs), light emitting diodes (LEDs) for homes, schools and businesses and ultra efficient traditional fluorescent bulbs with electronic ballasts for commercial buildings and schools. When replacing bulbs, look at the number of lumens produced.

- CFLs** use 75 percent less energy, emit much less heat and last six to ten times as long as incandescent bulbs. Although they contain minute amounts of mercury, they are safe to use and can be recycled at many retail centers and other locations to protect the environment.
- LEDs** use at least 75 percent less energy than incandescent bulbs, but last 25 times longer and emit little heat. They are ideal for spot lighting since they emit light in a specific direction.



DAY LIGHTING

Take advantage of an absolutely free light source, the sun! Skylights, light shelves, and properly placed windows can allow plenty of natural light without sacrificing thermal comfort. Most people prefer natural lighting over artificial lighting and it doesn't cost a penny.

WINDOW COVERINGS

There are many options to allow daylight in while blocking heat transfer through windows.

- Blinds and Drapes** — Open blinds or drapes to let light in for the morning. Afternoon sun is more intense, and you may need to close drapes and place blinds at an angle in the afternoon to block heat. Be sure to close blinds and drapes at night to maintain the temperature of the room after the sun sets.
- Tints/Films** — Tinted windows can reduce glare and provide privacy, but also reduces the amount of ultraviolet light entering the building, preventing heat gain. Increased reflectance of the glass can block 50 percent of the sun's heat. Many low-E films can be added to existing glass to decrease the amount of heat penetrating while allowing light through.

APPLIANCES

When shopping for appliances, look for the yellow and black EnergyGuide label. It will give you an estimate of a product's energy consumption. Here are some tips to maximize efficiency of your appliances:

- Refrigerator** — check the door seal, check the temperature (optimal is 38 °F, 3 °C), and keep a fairly full refrigerator and freezer so less air needs to be cooled.
- Laundry** — wash with cold water, do full loads, use a clothesline.
- Dishwasher** — wash only full loads, use air dry and energy saver settings.
- Oven** — limit or skip preheating, cook multiple items at once, keep oven door closed, use a microwave oven when possible rather than the conventional oven.
- Range** — Use lids when cooking, match the burner and heating element to the pot size.
- Water Heater** — set water heater to 120 °F (49 °C), use a timer to turn heater off during the day.
- Electronics** — use "smart" power strips as a central "off switch" to avoid phantom loads.



Take Action at Home: Replace bulbs and use the tips for day lighting, window coverings and appliances.
Take Action at School or Work: Replace incandescent bulbs with CFLs, start a CFL recycling box.
Take Action in the Community: Promote energy efficient bulbs and CFL recycling.
Find It on the Front: Find the person installing a CFL, ENERGY STAR appliances, and a clothesline.
To Learn More: Visit georgiapower.com/learningpower

THE THREE "R"s AND A "T"

WHAT'S THE "T"?

You have heard of the three "R"s of conservation: Reduce, Reuse and Recycle. To practice energy efficiency, we add a "T" for technology. Other "T"s are to THINK about our choices, TALK to others about energy efficiency and TAKE ACTION to improve the efficiency of our homes, schools, and businesses.

- Reduce** — to use less of something.
- Buy in bulk and look for items with the least amount of packaging.
 - Avoid disposable items, such as shopping bags, paper plates and napkins, and plastic utensils.
 - Don't drive your car when other modes of transportation are available.
 - Use efficient CFLs and LEDs.
 - Turn off electronics and appliances when not in use to reduce energy. Use smart power strips to cut off phantom loads.
 - Unplug devices not used on a regular basis and when going on extended vacations.



- Reuse** — to use something over again for the same purpose.
- Donate used items to thrift stores, and shop at thrift stores for items you need.
 - Use both sides of the paper when doing work or making copies.
 - Use old containers and used paper for art projects.
 - Use plastic bags to line your garbage cans. They also make great package stuffing, rather than using packing peanuts.

- Recycle** — to use old materials to make a new object.
- Check with your workplace or school to see what is being recycled now.
 - Check with your local municipality or waste hauler and earth911.com to see what recycling programs and centers are available in your area.
 - Most places have recycling programs for cardboard boxes, paper, plastics, glass and metals.
 - Compost lawn clippings and food waste for lawn mulch and fertilizer.
 - Recycle ink/toner cartridges and small electronics. Many recycling programs offer cash for these items.



THINK! ENERGY — think about energy, talk about energy to others, and take action now to be energy efficient!

- Use the energy checklist at the left and tips from the other panels of this poster to audit your home.
- Form an "E" team or Energy Action Patrol or Watt Squad to reduce energy use. Start or expand a recycling program.
- Visit georgiapower.com/learningpower

ABOUT NEF

National Energy Foundation is a unique 501 (c) 3 nonprofit educational organization dedicated to the development, dissemination, and implementation of supplementary educational materials and programs. These resources for education relate primarily to energy, water, natural resources, science and math, technology, conservation, energy efficiency and the environment. They recognize the importance of natural resources to our economy, to our national security, the environment, and our quality of life.

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