


The background of the left page is a collage of US dollar bills, including \$100 and \$20 bills, in a warm, golden-yellow color palette. Overlaid on this background is a checklist with three items, each in a square box. The first box contains a checkmark, the second is empty, and the third is empty. The text 'HOME ENERGY SAVINGS' is printed in a bold, white, sans-serif font at the bottom left of the page.

HOME ENERGY SAVINGS

The right page has a white background with horizontal blue lines. The word 'HANDBOOK' is written vertically in a large, bold, red, distressed font, running from the top to the bottom of the page.

HANDBOOK

HOME ENERGY SAVINGS HANDBOOK

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YOUR ENERGY DOLLAR

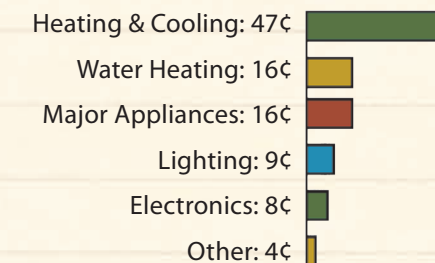
THE COST OF HOME COMFORT

It may seem a mystery that monthly energy costs vary widely among similar households. Reasons for these differences may not be readily apparent. Sealed ducts, shaded windows, sealed air leaks, and equipment efficiency go a long way to reduce monthly energy bills.

Occasionally, a sudden, unexpected change may occur in the amount of your energy use. Extreme weather is the most likely cause. Other reasons may be household visitors, a change in the thermostat setting, a leaky hot water pipe, a faulty well pump, a dirty filter or repairs needed on heating and cooling equipment. Be sure to check the number of days in the billing cycle. If you were away from home, see the chart below. Then make a list which "energy users" were operating at home while you were away!

WHERE IS ENERGY USED?

Knowing where you spend your energy dollars is the first step in controlling monthly energy cost. For many homes in our geographical area, the annual energy dollar looks something like this:



However, for leaky homes with old inefficient heating/cooling equipment, heating and cooling costs can be much higher than indicated above.



Comfort Advantage® represents energy efficiency programs, product efficiency standards, other energy information and home services provided by your local electric power association. The goal of the Comfort Advantage Program is to partner with members, so they may receive the most value from each energy dollar while enhancing comfort and quality of life.

MEASURING ELECTRICITY

WHAT'S A KILOWATT-HOUR?

Just as you purchase gasoline by the gallon and vegetables by the pound, you pay for electricity by the kilowatt-hour (kWh). Your monthly bill indicates the number of kWh used in your home during the billing period. The national average cost of the residential kilowatt-hour is 11.55 cents (2009). Of course your cost may be different and will vary with the amount of use each month.

To calculate the number of kilowatt-hours used by household equipment, find the number of watts on the label or nameplate and determine the hours of operating time. Remember that some appliances, like an oven element, cycle "on" and "off".

(Watts x Hours) divided by 1000 = Kilowatt-hours**

- 1 kWh used for each:** 100-watt light bulb used for 10 hours
13-watt compact fluorescent light bulb for 77 hours
3-ton air conditioner* for 22 minutes
1 HP Swimming pool pump* for 48 minutes
Personal computer* sleep mode for 33 hours

* Use varies with equipment efficiency.

** If wattage is not listed on an appliance nameplate or label, multiply amps x volts to get an estimate of wattage for most household equipment.



READING YOUR METER

Keeping track of your energy use by reading your electric meter is a good way to understand the ups and downs in your energy cost. Read your meter at the same time each day or each week to note changes in use. Make notes at each reading as to weather changes, home visitors, thermostat settings, and other events.

KWh used are indicated by the changing digital numbers on the meter face. Record those readings on this page and record the amount of use that occurs between each reading.

DATE & TIME:

READING:

Use:

NOTES:

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
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_____	_____	_____	_____
_____	_____	_____	_____

HOME ENERGY USE

Appliance:	Avg. Monthly kWh Use:
Refrigerator / Freezer (in conditioned space)	
1992 model; 21 cubic ft.	107
2000 model; 21 cubic ft.	71
2010 model; 21 cubic ft. ENERGY STAR® purchase	34
Freezer	
1992 upright; 21 cubic ft.	123
2010 ENERGY STAR® upright	57
1992 chest; 21 cubic ft.	77
2010 chest; 21 cubic ft. ENERGY STAR® purchase	37
Clothes Dryer	
8 loads/week	146
Clothes Washer	
front load – 8 loads/week (cold water)	20
top load – 8 loads/week (cold water)	56
Dishwasher	
4 loads per week	42
Cooking	
Oven	69
Electric cook top	36
Microwave Oven (1/4 hr/day)	11
Slow-Cooker (8 hrs/day 5 days)	12
Water Heater, resistance storage	300 – 450
Heat Pump Water Heater	142
Pool Pump (1 HP - 12 hrs per day)	455
Hot Tub (32 hrs per month)	192
Ceiling Fan (12 hrs per day)	44

Avg. Monthly kWh Use:

Lighting	
2 60-watt bulbs – 10 hrs per day	36
2 15-watt CFL bulbs-10 hrs per day	9
Computer & Monitor (4 hrs per day)	
PC Sleep Mode all other time	18
Water Bed	
heated and covered	117
heated at higher temperature	270
Plasma Television (8 hrs per day)	86
Small Standard Television (8 hrs per day)	21
VCR/DVD (4 hrs per day)	4
Stereo (4 hrs per day)	6
Hair Dryer (10 minutes per day)	6
Clock Radio	7

Heating and Cooling:* Avg. Monthly kWh Use:

Electric Furnace + Older Central Air (3-ton)	1643
Old Low Efficiency 3-ton Air Source Heat Pump	1165
New High Efficiency ENERGY STAR® 3-ton Heat Pump	795
Geothermal System ENERGY STAR® (3-ton)	420
Important Note: This geothermal system will also reduce your water heating needs by around 200 kWh per month. (free water heating)	
Room Air Conditioner (12,000 btu or 1 ton)	
(varies with outdoor temp. settings, and efficiency)	480
1500-watt small room heater	
(actual time cycled "on" 12 hrs per day)	540

* Use is based on central Mississippi climate. Older inefficient units will use more energy. Use will vary according to home construction, weather changes, thermostat settings, and unit sizing. Duct leakage will increase use significantly.





ENERGY QUICK TIPS

HEATING / COOLING:

- Seal duct joints with mastic. See pages 12-17.
- Install a programmable thermostat to lower energy use while you sleep or while you are away.
- Replace or clean filters on central systems at least once a month.
- Make sure that the return air filter grille is large enough. The return filter grille size for an average three-ton system should be around 600 square inches total or more. A high noise level at the return grille indicates restricted air flow.
- Undercut interior doors to allow air flow between rooms.
- Use kitchen and bath exhaust fans for excess moisture removal. Turn off when not needed. These fans can remove all of the conditioned air in a house in an hour, so limit use.
- Shade the outside unit of your air conditioner by planting trees or shrubs. Do not block air flow.
- Install ridge and soffit ventilation in unconditioned attics.
- Install a continuous vapor barrier (6 mil polyethylene) on the ground of the crawl space under your home
- Close the damper on fireplaces that are not in use.
- Wear seasonal clothing indoors to reduce heating and cooling needs.
- Lower the thermostat setting in winter and raise the temperature setting in summer.

WATER HEATING:

- Insulate all accessible hot water pipes with pre-cut foam insulation sleeves.
- Insulate cold water supply pipes at the water heater for a length of five feet.
- Repair all leaky faucets and pipes.
- Wrap your electric water heater tank with a water heater insulating jacket, according to instructions.
- Lower the water heater temperature setting to 120 degrees.
- Install a timer to automatically control your water heater.
- Install high-efficiency shower heads, and low-flow faucet controls.

LIGHTING:

- Use a simple-to-install wireless timer system, a motion sensor, or a photocell to control outdoor lighting.
- Save time on household chores with longer life compact fluorescent lamps (CFL). Replace each heavily-used standard incandescent bulb with one CFL, instead of changing each bulb 8-10 times.
- Remember that compact fluorescent bulbs may cost more to purchase, but most CFLs pay for themselves many times in energy savings.
- To select the right CFL, note instructions on the lamp packaging for mounting height limits or for climate on outdoor use.
- For indoor non-CFL bulbs, use occupancy sensors to automatically turn lights off when you leave the room.





APPLIANCES:

- Use small appliances and microwave ovens for the most efficient cooking.
- Use the cold water cycle on your clothes washer.
- Wash and dry full laundry loads.
- Check to see that the dryer vent exhausts to the outside and is not blocked by lint build-up.
- Clean the lint filter in the dryer with each load.
- Close the refrigerator or freezer door over a dollar bill. If the dollar bill slips out easily, the door seal may need to be replaced.
- For manual defrost freezers, defrost when ice builds up more than 1/4 inch.
- Use the air-dry cycle on your dishwasher or open the door after the rinse cycle is complete.

POOLS & SPAS:*

- Use a pool cover and open it completely when pool is in use. Use a programmable timer to turn pool pumps "on" and "off" for many short periods each day. Total daily "on" time will be less than six hours for many pools.
- Keys to lower pool energy use are minimal pump size (3/4 horsepower or smaller for most residential pools); a high efficiency pump; a large filter rated at 50% higher than pool's design flow rate; and short lengths of large diameter pipes while avoiding 90 degree elbows.
- For heated pools, use a heat pump water heater or geothermal system. Every one degree temperature reduction can save 5-10% of pool heating energy.
- Use a marine-grade, heat-sealed, R-14 spa cover that latches snugly when the spa is not in use. Water-logged covers waste energy. Use a floating thermal blanket.

* This does not necessarily apply to jetted bath tubs that are drained with each use.

SHOPPING FOR EFFICIENCY

ENERGY STAR® MEANS ENERGY SAVINGS:

Purchasing decisions may have a greater impact on your energy bill than efficient use. Although you may have to pay a little more for ENERGY STAR® products, the energy savings will usually recover added cost in a reasonable amount of time. After that, the energy savings is yours to keep. When you replace appliances, lighting, heating and cooling equipment, electronics, or windows, look for the ENERGY STAR® label. ENERGY STAR® is a registered mark owned by the United States government.

THE ENERGYGUIDE LABEL:

The large yellow EnergyGuide label on major appliances will help you compare efficiency. For a true picture, be sure to know your average utility cost per kilowatt-hour (kWh) for electricity and cost per gallon or therm (ccf) for gas. The label indicates the national average energy cost, which may be different from your local cost.





PURCHASING HEATING / COOLING EQUIPMENT:

- For the most efficient heating/cooling and water heating technology, purchase an ENERGY STAR® geothermal system. The higher the EER (Energy Efficiency Ratio) and the COP (Coefficient of Performance), the more efficient the system.
- Purchase an ENERGY STAR® air-to-air heat pump or central air conditioner with a high Seasonal Energy Efficiency Ratio (SEER) for lower summer cooling costs. SEER range from 13 to around 20. Your new air-to-air heat pump should have a high Heating Seasonal Performance Factor (HSPF) for lower winter heating costs. HSPF ranges from 7.7 to around 10.7. Some ductless split systems have even higher efficiency ratings.
- If replacing a central air conditioner in a gas heated home, consider a high efficiency dual fuel or piggyback heat pump instead.
- Avoid installing the indoor air handler unit in the attic. Attic air handlers can waste at least 10% to 25% of heating/cooling energy.

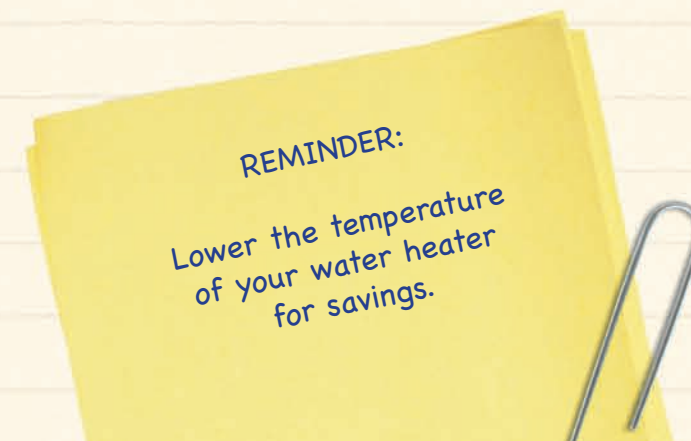
PURCHASING WINDOWS, SOLAR SCREENS AND KITS:

- Check your local building supply store for low-cost interior storm window kits. Note the child safety hazard for non-rigid plastic films. Consider rigid plastic.
- Consider placing solar screens on existing windows for summer shading.
- Purchase windows with the ENERGY STAR® label including a designation for southern (coast) or south central climates. Some windows are designed to flip sides for different seasons.
- For southern climates, a window with a low Solar Heat Gain Coefficient (SHGC), is recommended (.27 SHGC). Ratings should appear on the National Fenestration Rating Council (NFRC) window label. If not, the window may not be officially rated.
- A low window U-factor is important for winter energy performance. (less than or equal to .30 is recommended for north Mississippi. A .35 or less U-Factor is a good choice for south Mississippi.)
- Shop for a high Visible Transmittance (VT) rating for allowing visible light to enter the window. A VT below .5 is usually unacceptable to most people.
- Buy a window with low Air Leakage (AL) Rate, .1 or .2.
- To avoid condensation, look for a high Condensation Resistance rating. Ratings range from 0 to 100.



PURCHASING A WATER HEATER:

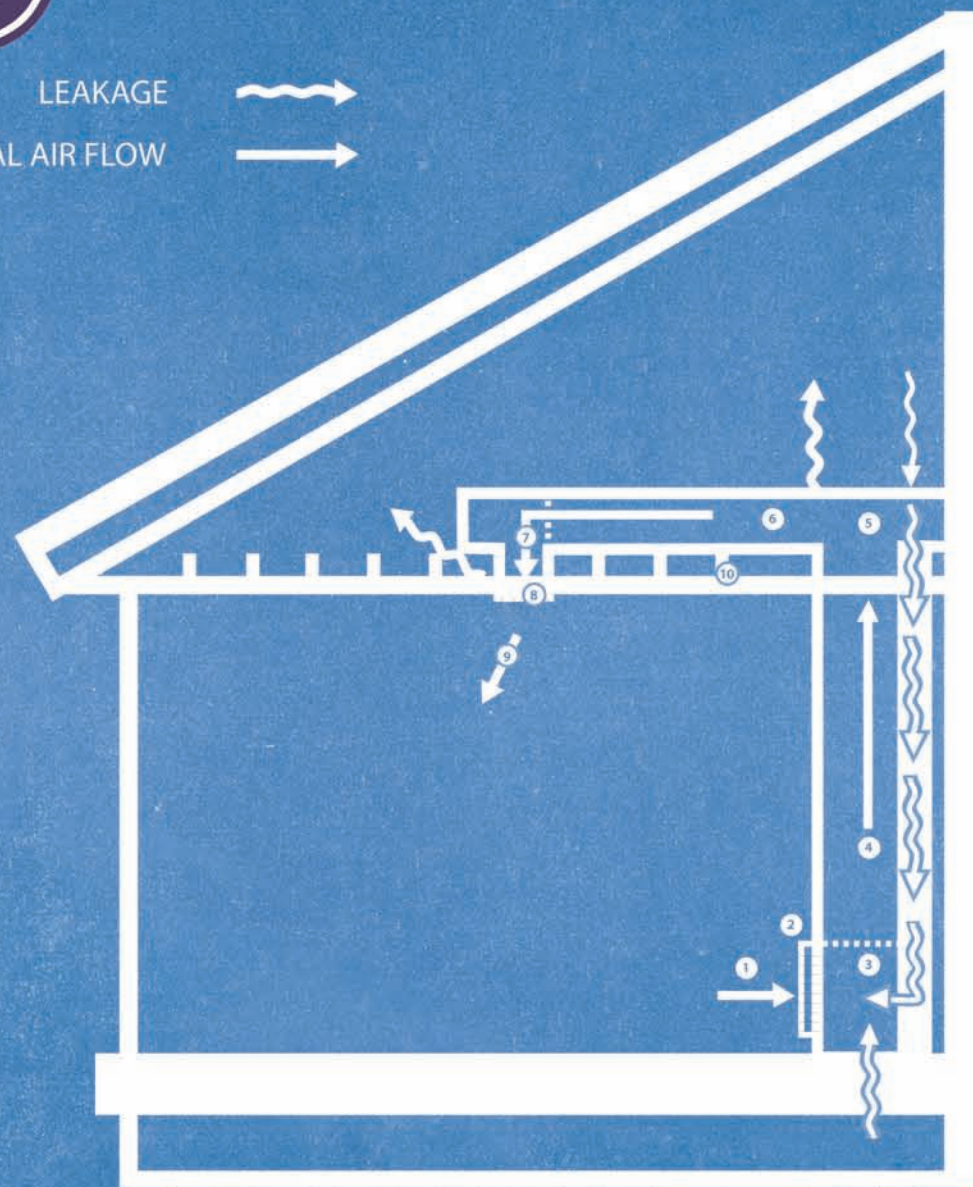
- Look for a high Energy Factor (EF) rating. EF ratings for electric resistance water heaters range between 0.7 and 0.95; and heat pump water heaters range from 1.5 to 2.0.
- If your new water heater doesn't have a heat trap, install one upon heater installation.
- Purchase the correct size storage water heater and place close to points of use. Generally, a 40-gallon tank will suffice for two people, and 50-gallon tank for three to four people.
- For a possible 50% savings on operating cost, buy a heat pump water heater. Initial cost will be more. Add-ons are available.
- Consider other alternatives to electric whole house tankless water heaters. Due to the size of tankless or instantaneous water heater loads, some consumers have incurred the expense of upgrading electric service to the home. Tankless whole house, electric heaters may not provide enough hot water for multipurpose household uses at the same time. In decision making, consider avoiding the higher cost of purchasing a tankless heater. Explore other household energy-saving investments for faster payback.
- The best electric water heater purchase may be a storage unit with an energy factor of .95. Small point-of-use tankless units may be appropriate for seldom used remote sinks, such as pool houses or utility sheds.



REMINDER:
Lower the temperature
of your water heater
for savings.



LEAKAGE 
 NORMAL AIR FLOW 



- 1 = RETURN AIR
- 2 = RETURN AIR GRILLE
- 3 = RETURN AIR CHAMBER
- 4 = AIR HANDLER
- 5 = PLENUM
- 6 = MAIN SUPPLY DUCT
- 7 = SUPPLY AIR DUCT
- 8 = SUPPLY AIR REGISTER
- 9 = SUPPLY / CONDITIONED AIR
- 10 = CEILING JOIST



ENERGY PROJECTS FOR SERIOUS SAVINGS

PROJECT #1: DUCT SEALING

Why Seal Leaky Ducts?

Aside from installation of energy efficient equipment, the single most effective energy-saving measure in most homes is duct sealing.

Supply duct leakage wastes energy two ways. First, conditioned indoor air leaks from ducts into the attic or crawl space. Then, humid outdoor air rushes into the home through cracks and crevices to replace the lost air. Supply duct leakage contributes to unhealthy indoor air quality by pulling in fumes from garages and by creating conditions for flue gas back-drafting.

Sealing return air leakage is a top priority for fast energy savings. Unconditioned attic air being pulled into the return air chamber can easily result in 50% wasted energy for heating and cooling. Unsealed air handlers in the attic can pull in 110° air into the system during the cooling season. Outside air can be pulled into the return air chamber of closet air handlers from unsealed openings to the crawl space or from unsealed wall/ceiling spaces leading to the attic.

** See diagram on opposite page.*

Causes of Duct Leakage

- Accidental disconnection of duct work (people walking in attic)
- Boxes stored on top of ducts
- Poor original duct installation
- Disconnection during transport of manufactured housing
- Animals seeking crawlspace warmth in winter





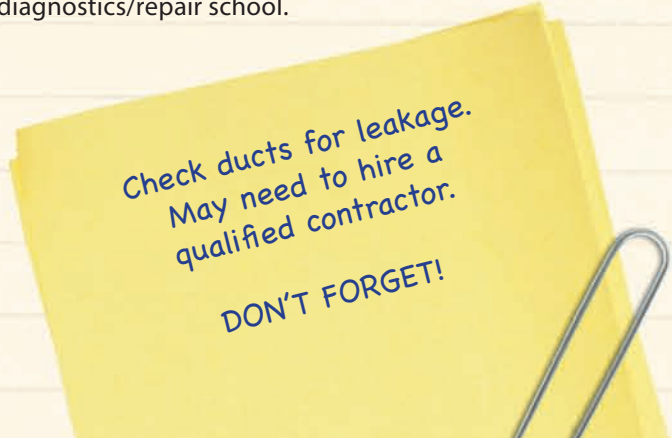
Duct Sealing continued...

Safety: Hire a duct contractor or “do-it-yourself”?

If there are gas appliances or gas equipment in your home, only a professional should perform duct sealing. Hiring a qualified heating and cooling contractor for diagnosing duct leakage or sealing ducts is the safest course of action. However, for electric-only heating and cooling systems, a skilled do-it-yourselfer, who has knowledge of heating and cooling systems, may decide to tackle the job. Regardless of whether you do it yourself or hire a contractor, check out “Online Energy Resource Guide” on pages 28-29 for more information. If you don’t have access to the Internet, go to your local library and ask someone to print the online information for you.

As another safety precaution, very old duct insulation and tape may contain asbestos, a cancer-causing agent. A qualified expert can identify asbestos and can proceed with the safest course of action. Only contractors licensed to perform asbestos abatement activities should undertake its repair, removal, or sealing. Do NOT attempt do-it-yourself work on materials containing asbestos.

A qualified duct diagnostics professional can use special equipment, a duct blaster or a blower door, to determine the amount of duct leakage. If leakage is obvious without testing, you can opt to skip the testing and start the duct sealing process. The technician who performs the sealing work should have been trained at a duct diagnostics/repair school.



Duct Sealing continued...

Finding Signs of Duct Leakage:

- Ducts that are disconnected, damaged, or kinked
- Attic insulation that has blown away from duct/ceiling connections
- Darkened insulation on a duct entering the return air
- A cooler than expected attic in the summer (if ducts are located in attic)
- An uncomfortable room that has too little air flow
- Mold, mildew, or condensation on the outside of duct wrap insulation
- Inside the return air chamber an open interior wall cavity that provides an unintended pathway for attic air to enter the return (This is different from a wall duct that returns conditioned air to the system.)
- Inside the return air chamber an unsealed open-ended conduit (a piping path for wires) that provides an air path from the outside (This is different from ventilation and may require a professional to identify.)

Do-It-Yourself Test:

Because duct leakage can cause pressure differences between inside air and outside air when the heating/cooling system is operating, you can conduct a simple test to look for signs. All duct leakage may not be indicated here. Do this on a very calm weather day.

- Open all interior doors.
- Close all exterior doors, windows, attic hatches, and fireplace dampers (no fire burning).
- Turn off all exhaust fans and the clothes dryer.
- Turn on the fan for the central heating/cooling system.
- Crack open by 1 inch an exterior door that is not near the return air grille.
- Feel the 1-inch door opening for significant air flow rushing into the home (a sign of supply duct leakage). If significant air flow is to the outside, return air leakage may be a problem. No air flow may indicate a balanced sealed system.





Duct Sealing continued...

Duct Sealing Materials:

- **Non-toxic fibrous mastic**, a “gooey” paste, can be applied with a brush, trowel or gloved hand on either sheet metal or flexible duct joints. The mastic label should indicate adherence to UL-181 standards and specified for duct sealing on your duct type. Water-based products may offer benefits, as worker exposure limits are noted on the material safety data sheets (MSDS). Read directions.
- **Fiberglass mesh tape / webbing** for ducts is used as reinforcement for mastic on wide gaps. Read directions and apply to clean surface as directed by manufacturer.
- **UL-181 Foil Backed Mastic Tape** – NEVER use the silver grey cloth duct tape for sealing ducts. UL-181 foil backed mastic tapes may be used, but may not seal as tightly or as long as “gooey” mastic. These tapes are more convenient, require no clean-up, and most produce almost no volatile organic compounds (VOC). Tape use could be limited to accessibility areas such as air handler cabinet exteriors.
- **Gloves and/or brush** to apply mastic
- **Cleaning supplies** as designated by mastic manufacturer
- **Face mask** for working near fiberglass or some other insulations
- **Work gloves and knife** for removing fiberglass insulation
- **R-6 to R-8 duct wrap** insulation with vapor barrier to replace any damaged insulation



Duct Sealing continued...

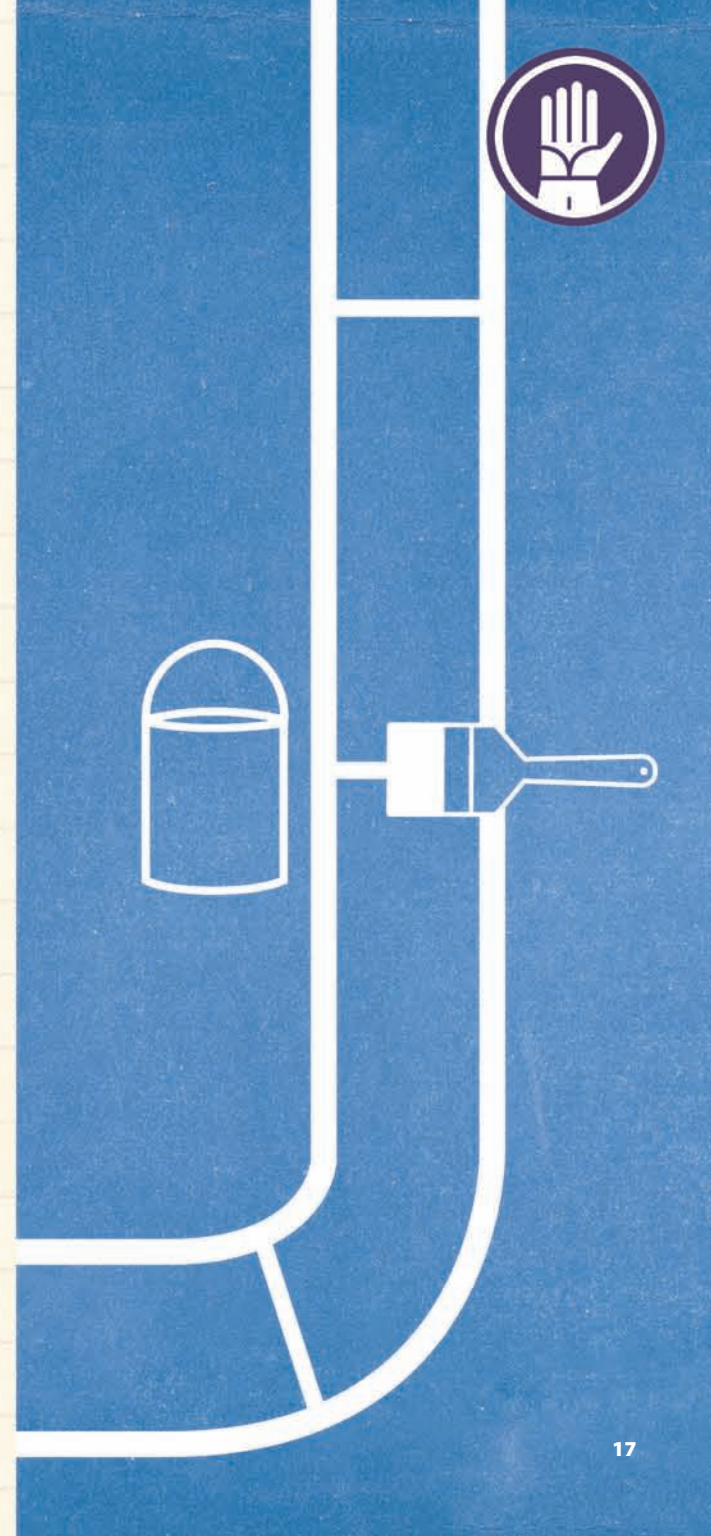
Duct sealing materials do NOT take the place of duct connectors such as sheet metal screws on metal ducts or adjustable bands on flex ducts. Connectors must be secure before applying sealant.

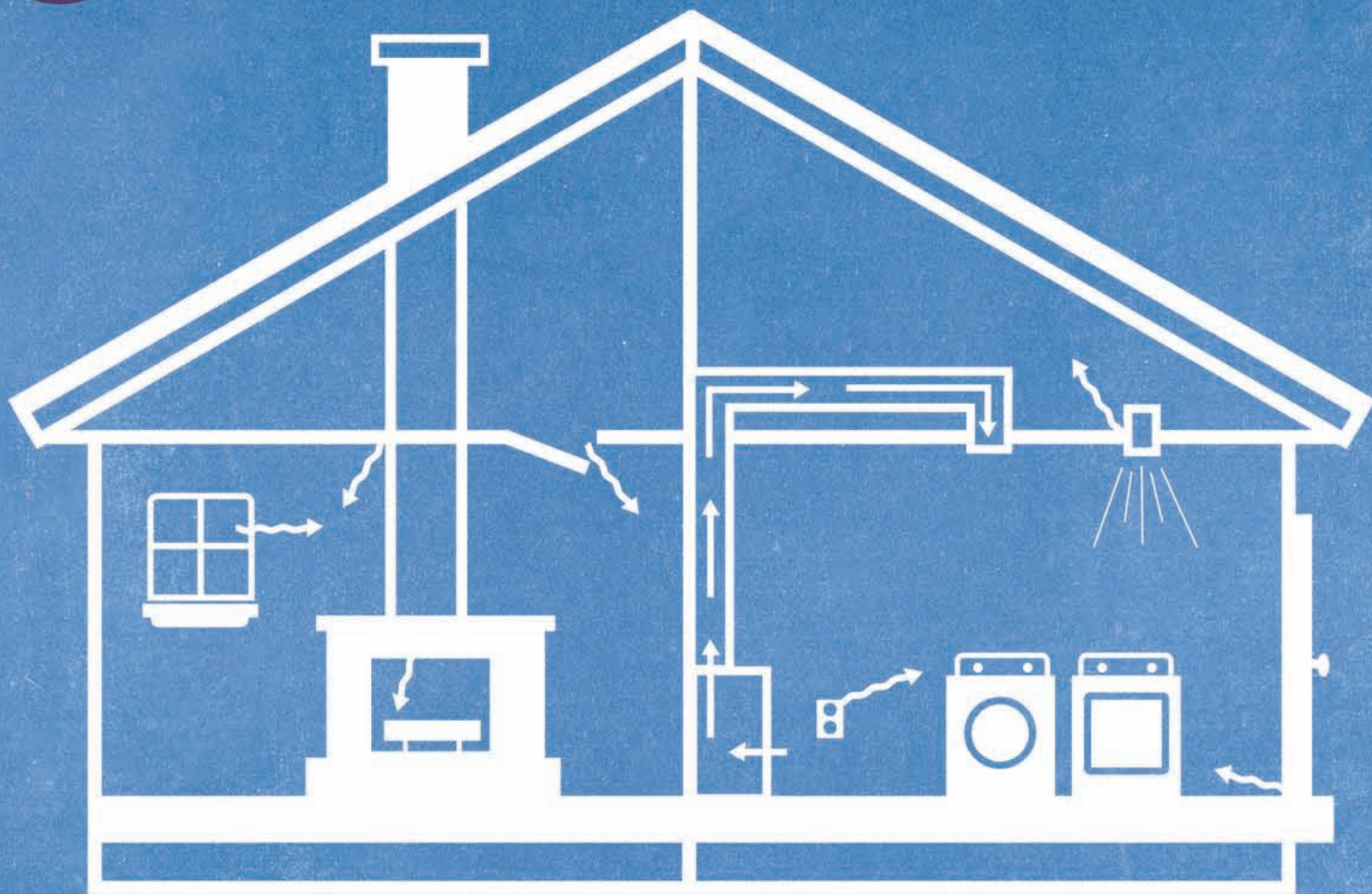
Sealing Ducts (qualified professional recommended):

For safety, attic duct sealing should not be attempted in very hot attics. In high temperatures, the worker may quickly become dehydrated. Read directions on duct sealing materials. Whether hiring a professional or doing it yourself, check for the following:

- Assure that air flow is not obstructed through ducts, through air handler, or into/ from the conditioned space during the sealing process.
- Remove any soft fiberglass duct wrap insulation from exterior of metal ducts.
- Seal the following sites with mastic:
 - All duct joints and seams
 - Duct connections to sheetrock or floor (Don't obstruct duct air flow into the room.)
 - Plenum/main duct joints to the air handler.
 - Seams on outside of blower cabinet use UL-181 tape for accessibility.
 - Allow mastic to dry for recommended time. Check seals and reapply where needed. Dry again.
 - Replace any fiberglass duct wrap insulation (R-value of 6 to 8), with vapor barrier* to the exterior.
 - Join/seal edges of exterior duct insulation vapor barrier with mesh tape and mastic or with UL-181 mastic tape.

* Vapor barrier-the foil backing on duct-wrap insulation





LEAKAGE 
NORMAL AIR FLOW 



ENERGY PROJECTS FOR SERIOUS SAVINGS

PROJECT #2: AIR SEALING

Why is home air sealing important?

Infiltration is the flow of outside air into the house through cracks and openings in home construction. Moldy, dusty air from the attic or crawlspace can infiltrate the home causing unhealthy conditions and energy waste. Moisture from outdoor air often causes building durability problems, mold, and mildew. Air sealing can significantly cut heating / cooling costs and increase comfort levels in the home. Although most insulation products do not provide air sealing, some insulation products reduce the need for air sealing procedures. (See "Insulating Your Home")

Can homes be too tight?

It would be difficult to air-seal an older leaky home to the point of requiring whole-house ventilation. Most homes have spot exhaust ventilation to the outside from the bathrooms and the kitchen for moisture and pollutant removal.

For very tight new home construction, balanced whole-house ventilation may be necessary. Whole-house ventilation systems, such as an energy recovery ventilator (ERV) must be professionally installed.

When using some gas systems or fireplaces in very tight homes, special precautions must be taken. See "Online Energy Resources" on pages 28-29 for a reference on combustion safety. Install carbon monoxide detectors; and rely on a qualified gas professional.

Do-It-Yourself

"Do-it-yourself" work will suffice for air sealing in many cases. If you are not skilled in home repair projects or are not able to safely perform the work, hire a professional air sealing / insulation contractor. For SAFETY FIRST, when sealing around electrical outlets and switches, disconnect the fuse or turn off the breaker switch to the outlet or switch. Test outlets with a lamp to see that lights will not turn on. Even then, never insert any object inside an electrical box.



Air Sealing continued...

Air Sealing Materials For Existing Homes:

- **Caulk** can be used for gaps less than .25 inch. Select caulk with a 25-year life based on needs, such as high temperature, mildew resistant, indoor / outdoor application or fire-resistant. Acrylic latex with silicones, silicone, or urethane caulk are acceptable. Rope caulk or backer rod may be used with some applications. Some caulks can not be painted.
- **Spray foam** will expand to fill large cracks and small holes but is not recommended near heat sources or flammable applications. Some low-expanding latex-based foams clean up with water.
- **Weather-stripping** can be used to seal doors, windows, attic access openings, and knee wall access openings. Door sweeps and thresholds are also necessary.
- **Polyethylene plastic**, drywall or rigid foam may be used for specific problem areas. Seams should be sealed with caulk or foam. (Sheet metal may be used with high temperature caulk to seal around chimney flues.
- **Special gaskets** are designed for use on electrical outlets and switches.
- **Interior storm window kits** for leaky windows may be needed.
- **A caulk gun and a putty knife** will be needed.

Home Air Sealing To-Do List

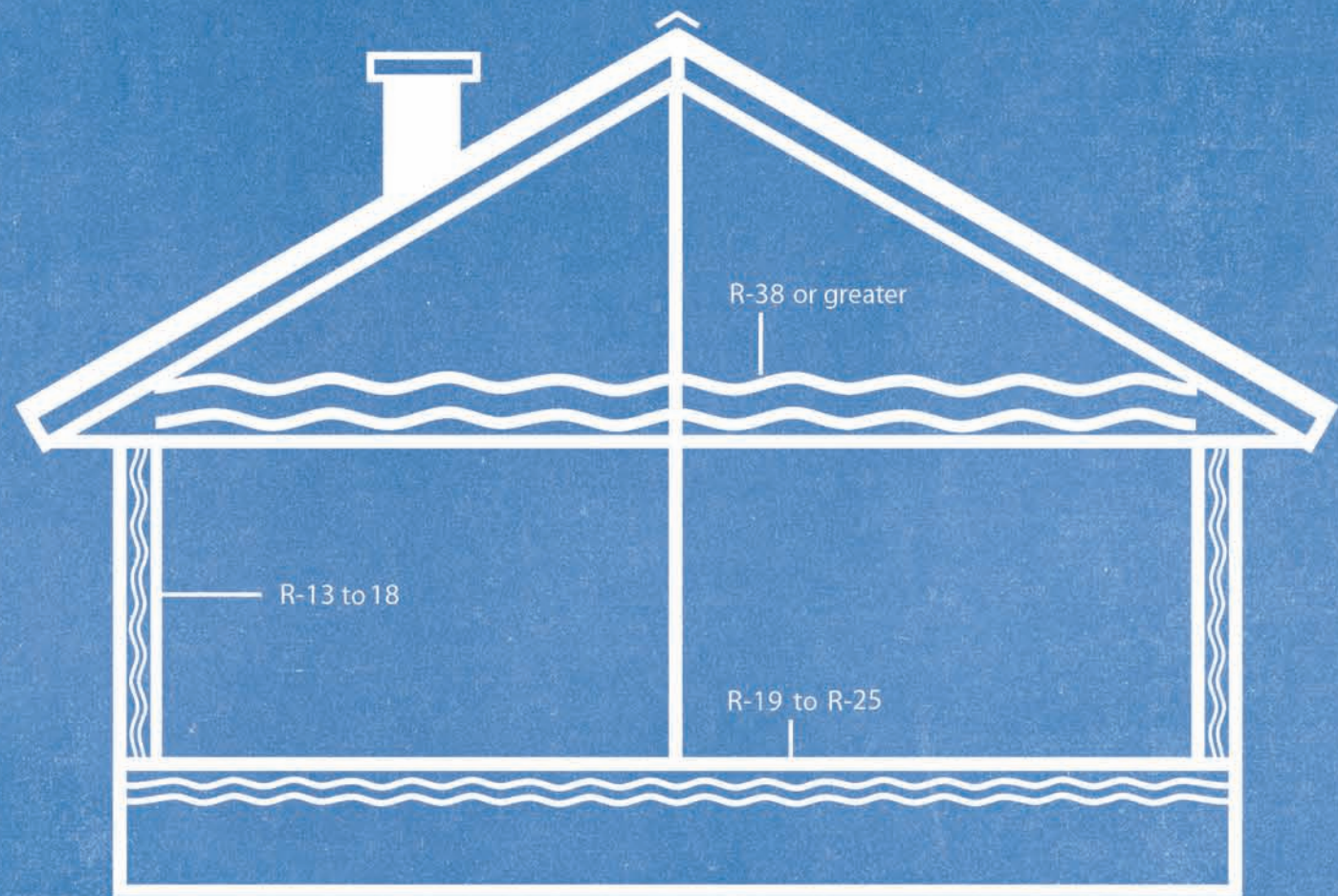
- Weather-strip windows, doors, ceiling attic access openings, and knee wall openings to the attic.
- Install a tight latch and insulate attic access openings and knee wall openings.
- Install a door sweep and a threshold at the bottom of each exterior door.
- Clean old dried caulk, apply new caulk from the crack between the outside window/door frames and the exterior wall. Apply new caulk to cracks less than .25 inch. For larger cracks use foam backer rod rope caulk to fill the gap, then cover with caulk.
- Caulk cracks where inside window/door frames meet interior walls.
- Install low cost interior storm window kits on leaky windows (See Purchasing Windows).
- Seal any plumbing or electrical penetrations through walls, top-plates (the horizontal top framing on interior and exterior walls), floors, and ceilings.



Air Sealing continued...

- Seal edges of light fixture boxes, outlet boxes and switch boxes to drywall with fire-resistant caulk.
- Install gaskets designed for electrical outlets and switches according to gasket manufacturer's instructions.
- Seal bath and kitchen ventilation fan boxes to dry wall with caulk.
- From a crawlspace, seal around drain penetrations with foam or by cutting a plywood patch and sealing with caulk.
- From the attic of 1-1/2 story homes, identify the walls of upstairs rooms. At the bottom of these walls, inside the attic, seal the air pathways from the attic to under-floor space of upper rooms.
- From the attic or crawlspace, seal around any chase penetrations for ducts, flues, vents, etc. Use a high temperature sealant according to place of application.
- If your air handler closet has no ceiling, check to see if there is a pathway for attic air to be pulled into the return air chamber. If so, hire a professional to assess. This repair can be a major energy saver.
- For undampened fireplaces that are NOT used, make a fireplace cover to seal the front opening. (This can be a hazard if fireplace is used.)





ENERGY PROJECTS FOR SERIOUS SAVINGS

PROJECT #3: INSULATION

Why Insulate?

The purpose of insulation is to reduce conduction of heat through floors, walls, and ceilings. Insulation slows heat flow into the house during the summer, and it keeps the heat inside in winter. However, if air flows through the insulation, or finds a pathway around the insulation, the insulating effect is greatly reduced. That's why air sealing the building envelope before insulating is important.

Where to Insulate:

The entire barrier between the outside air and the inside conditioned air should contain insulation. This building envelope includes ceilings, walls, floors over unconditioned spaces, soffits over cabinets, attic access panels, windows, knee-wall doors, and exterior doors.

How Much to Insulate:

The effectiveness of insulation is measured by R-value, with a higher R-value indicating greater effectiveness. As the thickness of an insulating material increases, so does the R-value. The recommended R-values are shown on the illustration.

- Ceiling: R-38 or greater
- Walls: R-13 to R-18
- Floors over crawlspace: R-19 to R-25

What type of insulation should I use?

Your choice of insulation product for an existing home may depend on whether you plan to hire a contractor or do it yourself. Proper installation will assure effectiveness. Be sure to read the manufacturer's material safety data sheet and installation instructions while selecting an insulation type. Here are some factors to consider about three insulation types commonly used for upgrading existing construction.



Insulation continued...

Cellulose: R-Value = 3.4 to 3.8 per inch. Cellulose, which is made from recycled newspaper, can be blown dry into existing wall cavities or blown damp into open wall cavities. Boric acid, an additive in cellulose insulation, increases fire resistance, repels insects, and helps prevent mold growth. For experienced “do-it-yourselfers”, installing cellulose in the attic may be a manageable task. However, wall blown cellulose is a job for a professional insulation installer. Cellulose should be blown at a density of around 3 to 3.2 pounds per cubic foot so that it doesn’t settle in walls, and so that it helps control air leakage. When comparing bids from insulation contractors, ask how many bags will be installed. Ask about how many pounds of insulation are in each bag. Many consumers refer to the coverage chart on the bag label and count the number of bags as they are installed.

Fiberglass: R-value for batts = 3.1 to 4.3 per inch. Fiberglass batts can be installed by an experienced do-it-yourselfer. Manufacturer instructions must be followed because compression of batts will cause a reduction in R-value. For blown insulation, see the R-value charts on insulation bags. Be sure to measure R-value by the number of bags installed per 1000 square feet of attic floor, because blown insulation can fluff and settle. Fiberglass insulation provides little reduction in air leakage, but when combined with extensive air sealing can be very effective. Gloves, a respirator, and protective clothing must be worn by the installer, because loose fibers may irritate skin and can present a respiratory health risk.

Spray-in-place foam: R-Value is 3.4 to 7.0 per inch Spray-in-place foam insulation is now becoming more common in the southeastern United States. Foams have high R-values for insulating, and have excellent air sealing properties. However, spray-in-place foam must be professionally installed and is more expensive. The sealed attic concept, spraying foam on rafters and wall ends of an enclosed, air sealed attic, rather than on the floor of a vented attic, has become a common application. Flammability and combustion characteristics of foam products vary according to the chemical formulation, combustion temperature, and available air. Many fire codes require a fire barrier covering over foam insulation, such as .5 inch gypsum wallboard.



ENERGY PROJECTS FOR SERIOUS SAVINGS

PROJECT #4: WINDOW SHADING

About Sunshine

Winter sunshine brings welcome comfort and light into the home. On the other hand, solar heat gain in summer can account for a significant portion of cooling energy use. How can carefully planned shading allow for winter sunshine, while blocking the summer sun’s rays?

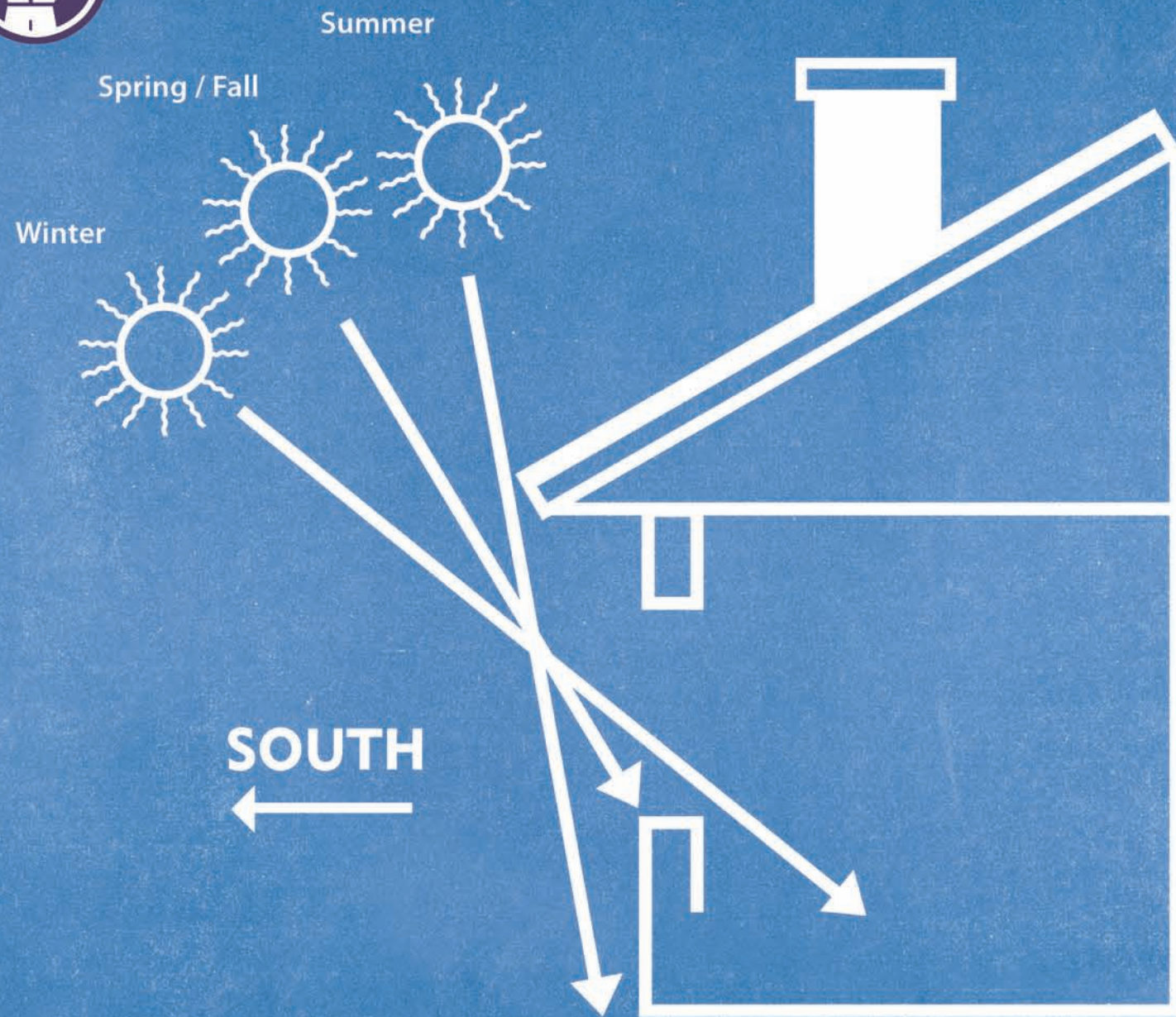
South Side Overhangs

The winter sun’s path slopes toward the south sky, so rays can shine under small overhangs on south-facing windows. With the summer sun rising high in the sky, the same overhangs will then cast shade on south-facing windows. In the mid-section of our state, an approximate 30 inch overhang will provide summer shade and winter sunshine to a 4-foot high south facing window (overhang 2' above window). Sunlight will begin shining beyond the shorter overhangs earlier in the fall. A six-foot window in the same location would require a approximate 36-inch overhang for summer shading (window 2' below overhang). In the southern part of our state, the approximate overhang projection would be two inches shorter, and in the northern part 2 inches longer. An excellent online calculator for sizing overhangs can be found on page 28 of this publication, listed under Windows.

Awnings and Shutters

Adjustable awnings and shutters can work well to shade windows, but can also obstruct view and cost more than other options. Awnings work better on south facing windows, where they can be raised in winter. East and west facing windows are exposed to the sun at a lower angle, where moveable shutters and other shading options work better to shade the window.

Great online calculator
for sizing overhangs!
[www.susdesign.com/overhang/
index/html](http://www.susdesign.com/overhang/index/html)



Window Shading continued...

Solar Screens

Solar screens (or sun screens) are usually the most cost effective shading option. Some of these screens can absorb up to 70% of solar gain. This alternative is not practical for windows which open outwardly, because installation is on the exterior. Solar screens should be removed in winter, so that winter sun can add warmth for home comfort. The lower the solar heat gain coefficient rating (SHGC) on the screening material, the more effective it will be.

Landscaping

Deciduous trees, those that lose their leaves in the fall, are most effective at reducing heating/cooling cost. On the south side, plant deciduous trees, with high canopies close to the house. Consider the mature height, shape, and root pattern when planting. Small trees, tall shrubbery, or vines on trellises are best planted to shade east and west windows. This landscaping can allow for low-angle summer shading in the late afternoon and early morning, when the overhangs or awnings fail to shade windows. Any south side evergreens should be located at least, twice their mature height from the house, so as not to block the winter sun path.

Reflective Solar Film

Reflective solar film may not be as effective as shading from the outside. Check with your window manufacturer to see if solar film will void the warranty. In selecting solar film, look for a high LSG value (light to solar gain ratio) exceeding the value of 1.0. Then narrow down your selection by finding the window with the lowest SHGC value you can find that is not objectionably dark to the eye.





ONLINE ENERGY RESOURCE GUIDE

General Efficiency

- **ENERGY STAR® Energy Efficiency Information- Homes & Products:** <http://www.energystar.gov>
- **Whole-House Energy Calculator From Lawrence Berkley Lab:** <http://www.homeenergysaver.lbl.gov/>
- **Tax Incentives for Energy Efficiency Purchases:** <http://energytaxincentives.org>
- **Appliance Selection and General Energy Information:** <http://www.eere.energy.gov/consumer/>
- **Home Air Sealing - Energy Star:** http://www.energystar.gov/ia/partners/publications/pubdocs/DIY_Guide_May_2008.pdf
- **Residential Energy Services Network - Home Energy Ratings:** <http://www1.resnet.us/ratings/overview/default.htm>
- **Home Energy Guide:** <http://www.aceee.org/consumer/consumer.htm>
- **Air Pressure Balancing In Homes:** <http://www.buildingscience.com/documents/information-sheets/hvac-plumbing-and-electrical/information-sheet-transfer-grilles-and-ducts/> ; or page two of http://www.northwestenergystar.com/downloads/Pressure_Relief_MPV_v1.1.pdf
- **Combustion Safety:** http://www.habitat.org/env/pdf/combustion_saftey.pdf

Heating and Cooling

- **Duct Sealing "How-To":** <http://www.doityourself.com/stry/airleaksduct> ; or <http://www.energydesignedhomes.com/Papers/DuctSealing.pdf> or http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts
- **Geothermal Heat Pump Consortium:** <http://www.geoexchange.org>

Windows

- **Window Overhang Calculator:** <http://www.susdesign.com/tools.php>
See Window Tools/Overhang Design
For calculator entries: Latitude for Gulfport, MS is 30 degrees North; Jackson 32 degrees N; Greenwood 33 degrees N; Tupelo 34 degrees N. Longitude ranges from western MS at 91 degrees West to eastern MS at 88 degrees West.
- **Window Selection and Benefits:** http://www.efficient-windows.org/homesexisting_guidance.cfm
- **Window Solar Films:** <http://www.fsec.ucf.edu/bldg/active/fenestration/ResOptions/films.htm>

Other Energy Resources

Home Energy Magazine; 250 Addison Street Suite 211B Berkeley, CA 94704 - Phone: (510) 524-5405 <http://www.homeenergy.org/>

Consumer Guide to Home Energy Savings-American Council for an Energy-Efficient Economy <http://www.aceee.org/consumerguide/> ; 250 Addison Street Suite 211B Berkeley, CA 94704 | Phone: (510) 524-5405

Your Comments and Questions:

Please let us know if this guide has been helpful in managing your energy dollars. We would appreciate your comments and suggestions in the interest of serving our members' needs. (Send comments to Marketing-Powell, PO Box 15849, Hattiesburg, MS 39404-5849). For answers to your questions, call your local electric power association marketing representative.

The information in this publication is meant to be a general guide for saving home energy. Not all recommendations apply to all homes. Any home projects or activities undertaken as a result of this printed information are to be executed in a safe manner, with the understanding that the distributor and publisher of this publication assume no liability, whatsoever. The publisher and distributor assume no responsibility for contents of websites referenced.

Fact Sources

National Average Cost of Residential kWh: Monthly Energy Review;
Energy Information Administration

<http://www.eia.doe.gov/emeu/mer/prices.html>
See Average Retail Prices of Electricity.

Appliance Energy Use: Federal Trade Commission

<http://www.ftc.gov/bcp/conline/edcams/eande/appliances/index.htm>

Residential Energy Consumption Survey; Energy Information Administration:

<http://www.eia.doe.gov/emeu/recs/contents.html>

Swimming Pool Energy - U. S. Department of Energy:

http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13290



Courtesy of Your Electric Power Association