* *ENERGY SAVING TIPS FOR THE HOME*

Are there any ways to beat the system? You bet there are! The first step is to take a look at where energy goes in a normal American home. The figures are well established. Some 70% goes to cool and/or heat the house; 20% heats water; 10% runs lighting and appliances.

With that for starters, here are some practical things you can do right now to reduce your monthly utility expenses. Many items cost nothing at all, others involve minor expense for simple projects, most of which you can build or install yourself, a few require sensible investment that will pay for itself over a few years.

The following information is a collection from various sources such as:

- *Florida Public Service Commission*
- *Tampa Electric Company*
- *Minnesota Department of Public Service, Energy Information Center*
- *Northeast Utilities*

Home Energy Savings Guide

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I. Air Conditioning

- The "FAN" setting is selected at the air conditioner thermostat..........Instead, it should always be set on "AUTO". Set to cool on FAN, the blower pushes air through the ductwork continuously while the compressor cycles on and off. Moisture removed from the air while the compressor runs is reintroduced to the house when the fan alone runs between compressor cycles. Don't let this happen! Don't set the system on "FAN"! Set to cool on AUTO, humidity is kept lower, costs are much lower and comfort is higher. If your ducts are leaky (and most are) the FAN setting is especially costly to you.

- The air conditioner's air filter is clogged...........Air flow is restricted. When air flow is restricted your HVAC (Heating, Ventilating and Air Conditioning) system runs less efficiently. A clogged filter increases costs, reduces comfort and can lead to costly equipment failures. When air flow is severely restricted, ice grows on the air conditioner's evaporator coils, a condition that can precede "slugging" the compressor with liquid refrigerant. The resulting repair bill can exceed $1,000. Change the air filter religiously! It should be replaced monthly during summer and winter periods of heavy use.

- The evaporator coils are clogged with accumulated dust.........Air flow is restricted. Problems that result are much like those described above for dirty filters. If you have central air conditioning, all the air in your house draws through the air conditioner's filter, then through the cooling (evaporator) coils. Generally the filter doesn't clean the air; its purpose is to protect the equipment, in particular the cooling coils. In spite of the filter the downstream coils gather dust and grime over time. Energy efficiency is degraded by about 5% each year as the coils get dirtier! Your costs go up while comfort goes down. Have a service technician check the evaporator coils yearly and clean them if necessary.

- The air conditioner thermostat is set too low...........Often its operation is misunderstood. Your air conditioner runs no faster at a lower setting, it only runs longer. The recommended summer setting is 78 degrees. Set it 2 to 5 degrees higher when you're away in the day. Recent research in Florida reveals that home cooling costs increase 12% for each degree setting below 78 degrees. Your cooling costs can almost double if you set the thermostat at 70 instead of 78 degrees!

- The central heat pump is simultaneously cooling and heating ....and the cooling cost triples! Overall this is a rare condition, but memorable to all involved because the summer bills get so stunningly high. A variety of thermostat and wiring problems can be the cause. For example, we've found situations where 5,000 watts of supplemental heating strips come on whenever the air distribution fan runs, winter or summer. The auditor detects the problem by running the cooling system alone (other appliances off at the breaker panel) and timing the meter spin to calculate power draw. A 5,000 watt overage is readily detected by this method.

- Teenagers...........are full-sized human beings who deserve as much respect as people of other sizes and ages, even if they use a lot of energy per capita but don't yet pay the bills themselves. Small children, by contrast, are low to the floor and relatively comfortable at levels of summer heat that stress many adults.

- The thermostat is miscalibrated........and so is the thermometer on the thermostat faceplate. The system cools lower than the temperature selected by the resident. For example, the thermostat might be set on 78 degrees, but an accurate thermometer shows that it's actually cooling to 75 degrees. This is an extremely common situation – We've found thermostats as much as 10 degrees off. The simplest solution is to rest an accurate thermometer on top of the thermostat, find out how much it's off, and compensate accordingly when you select the desired indoor temperature.

- The ceiling lacks adequate insulation..........Heat from the attic is conducting through to the house below. Improving ceiling insulation is one of the best investments you can make towards lowering your air conditioning costs in summer. If you're not sure what level of insulation you have in your attic, call us for a free home energy audit. The older your home, the more likely it is that its original level of insulation would now be considered inadequate. We still find some older homes with no insulation at all.

- Dogs have pulled air ducts apart beneath the house, cats have bedded for years in the ceiling insulation, possums have tugged open a crawl way where water pipes penetrate the floor and they're living in the hollow wall of the bath tub.........and so forth. Energy wise, the worst of these situations is where supply or return air ducts are disconnected in the crawl space beneath the house. Every summer at least one of our auditors reports finding the family dog comfortably housed in the return air plenum under a customer's house. It costs a lot to cool the outdoors!

- The air conditioning system is not getting enough air returned from the house......for a variety of reasons. We've seen return air grills set in the floor that are partly or entirely covered by a rug, for example. In addition to increasing operating costs, inadequate volume of return air back to the indoor HVAC coil is a major factor in shortening the life of central air conditioners. Too little air across the indoor coil can potentially lower the coil temperature to the point of ice formation on the indoor coil. An air conditioner with its indoor coil covered with ice is in a "destruction mode".

- The HVAC filter is located in a return duct plenum under the house.......and because it's so hard to get to, it's never changed. At some time in the past a plastic laundry bag was sucked into the return air system and is now plastered against the filter. Almost every energy auditor can tell of finding situations like this.

- The HVAC air handler, located in a hallway closet, is pulling return air from the attic as well as the house........adding considerably to costs. Sometimes this situation is discovered where the resident previously had a gas or fuel oil furnace in a hallway closet. Originally, the furnace pulled its combustion air from the attic through an opening in the closet ceiling. When the resident later switched to a heat pump, the furnace was removed from the closet and replaced with the heat pump's indoor "blower-coil" unit. But the ceiling opening remained. The new closet unit was set up to pull return air through a grill in the closet wall into the closet space, then through a filter mounted in the blower coil unit. But it's pulling air from the attic as well as the house! Most auditors have a story of first finding this problem when, with the air conditioner running, they climbed a ladder, lifted the attic hatch and noticed house air rushing past them into the attic.

- The air conditioning equipment is inefficient........for a variety of reasons. First, it may have been inefficient from the start. Equipment ten years old or older is likely to have an original efficiency rating of 7.5 SEER (Seasonal Energy Efficiency Ratio) or less. Today, Federal law requires manufacturers to achieve SEER 10.0 or higher for all split-system units, and SEER 9.7 for package units. What do these SEER ratings imply? You've probably already guessed: If your cooling cost is $600 a summer with a SEER 6.0 unit, your cost would be $300 a summer (for the same amount of cooling) with a SEER 12.0 unit. What other factors affect air conditioning efficiency? The big three are a). dirty coils, which at normal rates of dirt accumulation degrade efficiency by 5% each year; b). duct leaks, which in most Florida homes account for about 20% of air conditioning consumption; and c).

improper charge of refrigerant. How common are these types of problems? In 1988 a widely cited Arizona study of residential air conditioners found the following:

75% of the condenser coils were dirty
70% of the units had improper refrigerant charge
55% of the evaporator coils were dirty
45% had dirty blower wheels
35% had significant duct leakage
10% had a wrong motor or fan installed

- The HVAC refrigerant charge is low.........or it's high. Either way degrades efficiency. In 1990 a field study of residential central air conditioners found 27% undercharged and 27% overcharged. Overcharging is worse. The unit's cooling ability goes down while the power draw goes up: The unit runs longer to do the job, and costs more per minute to run. Overcharging also stresses the compressor, with serious consequences for its lifespan. The compressor is the most expensive system component to replace.

- The air conditioner's compressor runs all the time........whether the indoor distribution fan runs or not. Rare.

- The outdoor condenser is located beneath a wooden deck........and air flow is restricted. In summer, whatever heat is removed from the house by the air conditioning system is released to the outdoors from the condenser unit--that big metal box in the back yard. Hold your hand in the hot breeze from the propeller fan--it usually blows upward--and you'll get the idea. To work well it needs plenty of clearance from decks, bushes and folded lawn chairs. By the way, that hot air blowing from the outdoor condenser is not hot air from the house. It's outdoor air heated by passage across the hot condenser coils. The cleaner those coils are, and the easier it is for the heated air to get away from that unit, the better it works. Air conditioners and heat pumps only work well if kept clean!

- Leaky supply or return air plenums.......greatly increase the cost of air conditioning. Using blower door technology to test Florida homes for duct leakage, almost all systems are found to be significantly leaky. The most common sites of leakage are the supply air and return air plenums, which are the air collecting boxes on the upstream and downstream sides of the blower-coil unit that distributes air around the house. In the supply plenum, air pressure is greatest; in the return plenum, air suction is greatest. Any leakage from these boxes is exaggerated by the extremes of positive or negative air pressure close to the fan. In the distribution system as a whole, if supply air leakage predominates, the air pressure in the rooms of the house becomes negative with respect to the outdoors. If return air leakage predominates, the air pressure in the rooms of the house becomes positive with respect to the outdoors. A negatively pressured house sucks in warm, moist outdoor air, burdening the air conditioner; a positively pressured house pushes out expensively cooled indoor air, losing it to the outdoors. Usually mere duct tape is inadequate to repair these high pressure plenum leaks--it simply comes loose. Repairs that last use a gluey paste called mastic, typically having a high content of embedded fiberglass fabric and high tolerance for variations in temperature.

- In some apartments and town homes, the air conditioner's indoor component (the blower coil that distributes air to rooms) is located in a small closet, right over the electric water heater..............which in summer heats the passing air on its way to the a.c. cooling coils and fan. It helps to lower the water heater's thermostats to the lowest appropriate temperature (usually 115 degrees, or 125 degrees if the resident uses a dishwasher) and insulate the water heater.

- The HVAC system has moisture in the refrigerant........and efficiency is reduced 5-15%.

- The HVAC system draws warm, moist outdoor air through an unsealed PVC chase.......that routes refrigerant lines through the slab. Costs rise as the air conditioner works to cool and dry outdoor air admitted to the system by this and other routes

- The air conditioner's outdoor condenser sits baking in the sun........increasing its operating cost. A north side location for this unit is recommended. It's possible to shade it with trees, but remember that the condenser needs plenty of "breathing room".

- Vines, bushes, tall grass, leaves, litter or lawn chairs cover the air conditioner's outdoor condenser unit.........so it can't release heat.

- The air conditioner is oversized for the house..........so that it cools powerfully but doesn't run long enough to dry the air. The result is a cool, damp interior that doesn't feel right. To improve comfort, the resident lowers the thermostat setting a few degrees and the system runs longer. This dries the air but overcools it. Costs rise. Everyone should know this about air conditioning: Bigger isn't better. An oversized air conditioner cycles on-and-off frequently, removes less moisture and wastes energy. A system correctly sized for your house will run longer for less cost, dry the air better and give greater comfort than the next bigger size. Correct sizing is a particular concern in Tallahassee where we experience a very, very, very damp climate.

- Air conditioning supply registers around the house are closed off...........and the house becomes negatively pressured with respect to the out of doors, so that warm, moist outdoor air is pulled in. Additionally, airflow across the HVAC evaporator coil is reduced. The system's energy efficiency and cooling capacity are reduced. That is, for a given amount of cooling work to be accomplished, the system's running cost per minute and the number of minutes required both increase. Don't close off vents. Repeat: If you have a central air conditioner or heat pump, don't close off vents. A lot of older federal and state energy brochures and booklets have advised closing off vents but now we know better. Leave 'em all open.

- Bedrooms or other rooms are closed off, with no way for air supplied to the rooms to return (as the air conditioner operates)........Each closed-off room becomes positively pressured while the remainder of the house areas become negatively pressured with respect to the outdoors. The result is exaggerated leakage to the outdoors from positively pressured closed rooms, and from the outdoors into the negatively pressured house areas. Leakage occurs through bathroom vents, fireplace vents and dampers, around windows and doors, through recessed ceiling light fixtures, through electric plug and light switch plates, etc.

- An air conditioning supply duct leads to the garage..........where it simply wastes cool air to the "outdoors".

- The air conditioning system's return air grill is set low on a wall and blocked by a chair, or its set in the floor where it's covered by a rug...........resulting in restricted return air flow and all the attendant problems

- A small pool or spa is situated literally inside the house........Rare, but unforgettable. Why not do this? Because of the phenomenal moisture problems that result, not to mention high air conditioning costs. Remember, the air conditioner works to remove moisture as well as remove heat. Even in normal circumstances about 38% of the air conditioner's work (and operating cost) is devoted to moisture removal.

- The customer is attempting to cool the entire house with a variety of old, inefficient window air conditioners........Here's a topic that deserves a closer look. Our energy auditors have all observed that customers with window air conditioners usually have significantly lower bills than those with central cooling systems. Yes, lower. Why? Because only one or two rooms are being cooled, not the whole house. However, if four or five old window units are operating all summer to cool the whole house, then costs get high. Older window units often have energy efficiency ratings down around 5 EER; newer central systems are at least twice as energy efficient as that.

- The air conditioner's thermostat is near some source of heat........like a floor lamp. The thermostat gets fooled, it senses heat and calls for the air conditioner to run.....and run, and run.......Remember, small thermostat adjustments make a big difference to your cost. If your system cools to 73 degrees instead of 78, your cooling cost rises about 60%.

- The hallway wall behind the thermostat is hot.......because hot air is being drawn down from the attic through that wall cavity whenever the air conditioner runs. This tricks the thermostat into calling for more and more cooling. Finding the pathway of air leakage and sealing it cures the problem.

- The area where residents sit down to eat is heated by morning or afternoon sun streaming through a sliding glass door........and the whole house is cooled to a very low temperature in order to achieve acceptable comfort levels at that spot.

- A shade tree was removed........and air conditioning costs increased by up to 30% compared to last year. Shade is important!

- Air conditioning ductwork in a hot attic is poorly insulated.......Attic heat conducts through to warm the cool stream of duct air.

- The return air plenum box constructed of sheetrock is uninsulated and leaky and sits in a hot garage.........A fairly common finding.

- All the components of the air conditioning distribution system, including the air handler, supply ducts and a long return duct, are located in a hot attic.........Lots of older homes have their air conditioning systems configured this way.

- A room or wing or extension was added to the house, or a garage or porch was enclosed.........and the overall cooling costs go up.

- The air conditioner's thermostat mounted on the hallway wall is not level.........Behind the thermostat's cover plate its operation usually involves one or two mercury-containing glass bulbs that tip left or right as the temperature adjustment lever is moved. When you adjust the lever "downward", calling for cooling, the bulb tilts and a small blob of mercury rolls over to make an electrical connection. If the thermostat is off-level the mercury roll-over is affected, and the thermostat's calibration can be thrown off. For example, maybe you've set the lever to 78 degrees, but because the thermostat isn't level the system cools to 75 degrees. Cooling costs rise by 15% to 24%. Leveling the thermostat is fairly easy using adjustment screws behind the faceplate, but if you're at all uncertain about it, have it leveled when your unit is next serviced.

- The residents left town for a summer vacation and were expecting the next utility bill to be low........but they left the air conditioner at its normal thermostat setting during their absence and the weather was hot. For many folks, the best practice is to set the air conditioner's thermostat up to 83 or 84 degrees when away. The system runs once in a while, preventing indoor humidity from getting too high.

- House has a package-unit central air conditioner at one end, supply and return ductwork beneath the house and a garage converted to an uninsulated TV/family room at the farthest distance from the air conditioner. A couple of ducts are added to the air distribution system to supply cool air to the family room.......This is a recipe for high bills in summer, but even higher in winter. The ductwork has the longest possible run--both ways--to cool the room that gets the most evening use. The walls and ceiling need insulation. The air conditioner's delivery fan is probably not powerful enough to handle the additional area, and the add-on ducts result in an imbalanced system that no longer delivers the requisite 400 cubic feet per minute of air (per ton of cooling capacity) across the air conditioner's evaporator coils. It all adds up to high cooling and even higher heating costs.

- The air conditioning system is made up of mismatched components........ resulting in greatly lowered operating efficiency. The condenser section and evaporator section need to be properly matched, as specified by the manufacturer.

- A newly added room is hot so the thermostat setting for the whole house is lowered........meanwhile, in the attic, the air supply duct to the new room is laid out and connected to the "boot" above the register, but was never connected into the main system. By an installation oversight, no air is delivered to the new room. Surprisingly, most energy auditors have found unconnected air ducts like this at one time or another.

- The ductwork "boots" behind the registers are loose, or ducts have fallen away from the boots............and the system is cooling the crawlspace under the house.

- Flex duct in the attic is kinked or flattened, diminishing air supply to particular rooms............and the thermostat setting for the whole house is lowered to compensate. This kind of problem is especially significant if the rooms having insufficient air supply are the kitchen or family room. This is a common problem!

- The air delivery system includes some length of panned floor joists which are leaky.......... The spaces between floor joists are sometimes modified for use as return ducts. This cavity is made into a duct by attaching sheet metal over the bottom of the joists and by capping the ends of the joist cavity. A leaky panned floor joist draws in air from the crawl space or basement. To remedy, seal using mastic. The ceiling fans run backwards, breezing upwards. They should breeze downward, so you feel the breeze.

II. Domestic Hot Water Heaters

- Hot water leaks.......from a tub or sink faucet. Here's something we occasionally find: The water heater is located at one end of the house and there's a leaky tub faucet at the far end of the house. The leaking water feels cold. "Minor problem", you think. But it could be supplied from the water heater. An easy test: Tighten down the hot side handle and watch to see if the leak diminishes. Another test: Put a screwdriver tip to the hot water pipe where it exits the water heater, and press the handle end against your ear; the sound of running (hot) water is magnified. A third test: Feel the cold water supply pipe where it enters the water heater; if no hot water has been used in the previous half hour, the cold pipe should feel warm (heat from the water heater conducts to that pipe and warms it). If the cold pipe near the water heater is cold, and no hot water has been used recently, there may be a hot water leak; cold water is entering the tank (and cooling the inlet pipe) to make up for hot water being lost to a leak.

- The water heater's thermostat malfunctions, the tank overheats, tank pressure builds, the pressure-and-temperature relief valve opens to release a flood of scalding hot water.............under the house, where no one sees it. An actual case. Yes, the bills were high! In another similar case, in a student apartment we found the pressure/temperature relief pipe sending hot water from the under-the-counter water heater to a connection with the drain pipe beneath the kitchen sink. A steamy hot mist was rising from the sink drainhole; the utility bill had recently doubled. In most single family detached homes, the pressure/temperature relief line from the water heater emerges as a little down-spout low on the back side of the house or garage. If you find hot water plunging from that spout, call a plumber.

- The water heater thermostats are set too high........and each 10 degrees downward adjustment cuts water heating energy consumption by 13%. We recommend setting the thermostat(s) at 115-120 degrees. If you use a dishwasher that has no booster heater, set thermostats at 140 degrees; with a booster, set them at 125 degrees.

- Flush sediment from the bottom of the heater tank at least yearly. A build-up will insulate water from the heat source. If you hear water "gurgling" when the heaters on, you have sediment.

- Use cold water to flush away food in the sink garbage disposer. It works better than hot water, grease particles flush out and there's no build-up in pipes.

- Home cleaning (woodwork and so forth) works as well with cold water and proper detergents.

- Typically electric water heaters will cycle on 3 to 4 times throughout an evening (8 hours). With an insulating blanket (minor purchase at building supply store) properly installed, the cycle time could be reduced by 50%. An insulating blanket will also reduce the cycle time during a normal day.

- On electric water heaters an inexpensive timer can be installed to eliminate on time during the evening hours or when you are away on vacation.

III. Lighting

- All the lights in the house are on..........or nearly all. In most homes lighting only accounts for about 6% of the electric cost. The costs can add up, though, so keep up the habit of turning off lights when you leave a room. If you have ten 75 watt lights on for twelve hours a day, the cost (at $.0823 per kilowatt hour) is $.74/day, $22.53/month, $270.35/year. Over 99% of the energy provided to those lights is converted to heat, less than 1% to light. Remember that when you're trying to keep cool in summer!

- Outdoor area lights are on all through the day...........because of a bad photocell.

- "Light Zone" your house to provide good illumination for reading, writing, sewing or sketching, with wattage as low as possible elsewhere. Wattage saved in this simple manner can add up to almost three figures in a year.

- Use one large bulb in preference to three smaller ones where bright light is needed. A 100 watt lamp will provide better reading light than three 40 watt bulbs.

- "Long Life" incandescents use more energy than standard bulbs!

- Turn off all but one or two low-watt lamps when watching TV. You only need enough light to balance TV brightness and avoid eyestrain.

- Specify 4 watt clear night light bulbs. They use half the energy of the 7 watt and provide almost the same light.

- Keep all bulbs and shades clean. Dirt absorbs light.

- Use outdoor spots, floods and driveway illumination only when necessary.

- Use fluorescent bulbs whenever possible. A 40 watt fluorescent will use 140 watts less than a 60 watt incandescent in a seven hour period and provide more than five times the amount of light.

IV. Appliances

- The refrigerator that served for twenty years in the kitchen still works, and now it's in the garage.........And it's a hot garage. Those old refrigerators are not very energy efficient, but they sure last a long time! In a hot garage that old Coldspot may run almost continuously. The new refrigerator in your kitchen is probably two or three times (or more) as energy efficient, especially if it was manufactured after January 1, 1993. Energy wise, you're much better off organizing all your stored foods into the newer refrigerator and unplugging the old unit. How big a difference in cost can there be? A new, 25 cubic foot high efficiency refrigerator in the kitchen costs about $5 or $6 a month to operate; an old, inefficient unit in a hot garage can cost $25 to $50 a month in summer.

- The refrigerator door won't seal when it's shut, the door is askew or the gasket is damaged..........and cold air is being lost to the kitchen. Years ago our standard advice was: Properly align the door on its hinges and/or replace the gasket. Then we learned that replacement gaskets cost $50 to $80, are hard to find for some older models and are not assured to fit well as replacements. If your refrigerator is 10 or 15 years old and in poor condition, you're probably best off to replace it with new one rather than undertake gasket repairs. After January 1, 1993, new refrigerators are three times (or more) as energy efficient as similar sized units 10 or 15 years old. A new, 25 cubic foot energy efficient refrigerator costs $5 or $6 a month to operate. An old one costs three times as much or more to operate, and may cost much more if it's located in a hot garage.

- The family has a refrigerator in the kitchen, an older refrigerator in the pantry, a freezer in the pantry..........and so forth. Costs rise. If the newest refrigerator was manufactured after January 1, 1993 it's far, far more energy efficient than older refrigerators or freezers. Consolidate stored foods into the newest unit if possible!

- Manual defrost refrigerators and freezers should be defrosted regularly. More than a ¼ inch buildup of frost puts an extra load on the compressor motor.

- Food Storage – Grocery store wrap can act as an insulator. Before freezing meats, wrap them in moisture-proof paper, such as foil or freezer paper. Mark all items to help you find them quickly later, to prevent long searches with the door open. And before you open the door, take a moment to decide exactly what you'll need.

- Freezers are economical when used to store expensive items. Using a freezer to store low-cost bulky items is much less economical. Freezers are most efficient when kept full. This helps prevent loss of cold air each time the door is opened.

- Don't rinse dishes before putting them in your dishwasher; scrape or wipe them thoroughly. If you must pre-rinse, use cold water.

- Wait until your dishwasher is full before running it. Then be sure to use the right amount of dishwashing detergent; follow the recommendations on the brand you use.

- If your dishwasher has energy saving cycles, use them as often as possible. This can save 150 to 250 kWh per year.

- Avoid using the "rinse and hold" cycle; it uses three to seven gallons of hot water. Turn the machine off after the final rinse and let the dishes dry in the hat air or use the "cool/dry" or overnight setting on newer models.

- Keep your dishwasher drains and filters clean.

- Eight percent of the cost of running your dishwasher comes from the hot water it uses. A typical dishwasher uses between 8 and 14 gallons of hot water per load, depending on the washing cycle you choose. Costs will differ for the same cycle, depending on the temperature setting:

  10 gallons @ 120°F = 1.8 kWh or $.16
  10 gallons @ 140°F = 2.4 kWh or $.22
  10 gallons @ 160°F = 2.8 kWh or $.25

  Basesd on $.09 per kWh

  Start saving by setting your water heater thermostat at 120°F.

- If you're remodeling or building a home, locate your dishwasher as close as possible to you water heater. Heat is lost as it travels from the tank to your appliance, radiating from the pipes. Easy to install pipe insulation can help reduce heat loss.

V. Kitchen

- There's a whole lot of cooking going on..........Meanwhile the air conditioning runs nonstop to cool the kitchen. To avoid this, a lot of folks cook outside in the summer, eat more fruits and salads, eat later in the evening..........or use a microwave oven! For the same cooking job, a microwave costs far less than half as much to operate as a standard electric oven, and doesn't heat the kitchen. Here's a comparison of costs to cook a meatloaf, from a study by Northeast Utilities (adjusted to our utility rates):

Oven Type	**Cost**
Electric oven	17 cents
Electric convection oven	12 cents
Gas oven	10 cents
Electric frying pan	7 cents
Electric Toaster oven	8 cents
Electric crockpot	6 cents
Electric microwave oven	3 cents

- Never boil water in an open pan. It boils sooner and over less heat in a covered vessel. Once boiling, keep it rolling with as low as heat as possible.

- Clean range top burners and reflectors produce more heat with less energy.

- Don't put small pans on large heating elements or (on gas stoves) let the flame exceed diameter of pan. Heat missing the pot bottom is lost to the air.

- Turn off heating elements of electric stoves shortly before cooking time is up. They'll stay hot long enough to finish the job without using more electricity.

- Don't open the oven door to "peek and poke", it wastes heat. Use a timer for baking and roasting.

- Small electric fry pans and grills use less energy than a range or oven for small meals. A toaster uses less power than the oven or grill for family toast.

- Don't wash dishes under hot running water or you'll be throwing away gallons of costly heated water. Close the drain, fill the sink with warm water and detergent, and rinse with a hot spray in the dish drainer.

VI. Laundry

- Ninety percent of operating your washing machine comes from the hot water it uses. As you can see from the accompanying chart, the lower the water heater setting, the more economical the wash. Locate your washer as close as possible to your water heater to minimize heat loss through the pipes. And make sure the pipes leading from your tank to your washing machine are wrapped with insulation.

  Water Heater Thermostat Set At 140°F

Wash/Rinse Settings	KWh Used	Av Cost/Load
Hot/Hot	8.3	$.71
Hot/Warm	6.3	$.54
Hot/Cold	4.3	$.37
Warm/Warm	4.3	$.37
Warm/Cold	2.3	$.20
Cold/Cold	0.4	$.03

  Water Heater Thermostat Set At 120°F

Wash/Rinse Settings	KWh Used	Av Cost/Load
Hot/Hot	6.5	$.55
Hot/Warm	4.9	$.42
Hot/Cold	3.4	$.29
Warm/Warm	3.4	$.29
Warm/Cold	1.9	$.16
Cold/Cold	0.4	$.03

- Don't wash partial loads. Wait until you can fill the machine – unless it has a "small load" attachment.

- Always presoak badly soiled clothes, or use the soak cycle to avoid having to run a wash twice.

- Clothes can be cleaned successfully in warm water rather than hot water, and can be rinsed well in cold water. You'll save half the demand on the water heater with these easy steps.

- Someone's doing a mighty lot of clothes drying every day..........during the heat of the day, with a dryer located in an air conditioned utility room, vented to the outdoors. A clothes dryer has a powerful fan that whips air (house air in the case above) past the damp clothes at the rate of 150 to 200 cubic feet per minute (cfm). In a 1,500 square foot house with eight foot ceilings, a 200 cfm dryer can empty one houseload of air every 60 minutes of operation. In summer, that's a lot of expensively cooled house air being heated by the dryer and blown out. Just as bad, that's a lot of lost house air that must be replaced by hot, damp outside air leaking in fast wherever it can: Through kitchen and bathroom vents, fireplace vents and dampers, around windows and doors, through recessed ceiling light fixtures, through electric plug and lightswitch plates, etc. For all the above reasons, it's best to locate the dryer in an uncooled utility room or garage.

- The clothes dryer vents lint onto the air conditioner's outdoor condenser coils........The system, hampered in its ability to release heat, runs longer and longer.

- The dryer vent itself is clogged with lint..........and it takes longer and longer to dry a load of clothes. With the vent clogged, the clothes get a hot, damp tumbling, but little moisture is removed.

- Dry heavy and lightweight laundry separately if there's enough wash to two loads. Light clothes dry faster and use less energy. They may even dry with the residual heat left from the first load.

VII. Bathroom

- Some of the worst water leaks we find are at toilets...........where you can lose 100 gallons a day and never know it. Listen carefully for the faint, high whine of a toilet leak. Find out if tightening the water supply shutoff beneath the tank will stop the noise. Or, put some food coloring in the toilet tank. If the color appears in the bowl without flushing, you have a leak. Have you ever seen a "hung" toilet, where the mechanism catches in mid-flush and water rushes continuously out the drain? If you ever discover a toilet in your home that occasionally hangs, don't take chances, have it repaired. One flush uses about 7 gallons of water; a hung toilet that pours out a gallon every two seconds will lose 43,200 gallons in a day. Every once in a while a water customer has a toilet hang as they leave for a weekend...or longer. In just a few days, water loss is in the hundreds of thousands of gallons. The utility rate for metered water consumption is $1.22 per 1,000 gallons.......For 200,000 gallons: 200 x $1.22 = $244. Don't take chances with a hanging toilet: Costs can get out of hand in a hurry.

- Bathroom power vents are left running...........sending expensively cooled air to the out of doors. Run these vents only as long as needed to clear that one room of its moisture. If the bathroom is 10 feet by 12 feet with an 8 foot ceiling, it holds 960 cubic feet of air. Most bathroom fans remove about 50 cubic feet of air per minute. In the above example, nineteen minutes of fan operation sends out one roomful of air.

- Don't scrub nails or wash hands under a running stream. Fill sink for washing and rinsing, you'll use half as much water.

- Try five minute showers instead of 30 minute tub baths or showers. You'll use 25% less hot water. In a year it can amount to nearly $50 for a family of four in water heating costs.

- When brushing teeth, wet the toothbrush – turn off water - brush thoroughly – turn on water and rinse toothbrush. Don't let the water run while you're brushing.

VIII. Building Envelope

- Humid outdoor air is leaking into the house........through cracks around doors and windows, electrical outlets, ducts, vents or fireplace dampers that don't seal tightly. In Florida homes about 38% of the air conditioner's work (and operating cost) goes to drying out this moist air leaking in from out of doors. Leaks in the ducts that supply cooled air to rooms will make this situation much worse, because the overall house air pressure becomes "negative' with respect to the out of doors whenever the air conditioner is running. In this condition the house sucks in warm, moist air whenever the air conditioning system runs. The system runs longer to compensate. Even more warm air is drawn in, which needs to be cooled......and so forth in a vicious cycle. Costs rise significantly.

- The house is equipped with jalousie or awning windows designed for cross ventilation.........Instead the house is closed up for air conditioning. Or almost closed up: Unfortunately, these window types are notoriously leaky. In summer, the air conditioner must toil to dry as well as cool the air, and major air leaks cause major cost increases. (See #11 above)

- A rooftop power ventilating fan pulls hot air from the attic on summer days.......but a). The fan's thermostatic control is set too low (maybe 95 degrees instead of 115 degrees), so the fan runs more than it should; b). There's a lot of air leakage from the house across the ceiling to the attic, or bathroom and dryer vents open into the attic instead of passing through the roof, so that when the rooftop fan pulls air from the attic it also pulls air (expensively cooled air) from the house; and c). The fan motor itself is costly to run, and eats up any potential savings for having cooled the attic. In general, well insulated attics don't need power ventilation. Passive ventilation devices such as high ridge, off-ridge, turtle-back or gable vents, together with low soffit vents, are adequate. The optimum design is usually a ridge vent (internally baffled so that rain doesn't bounce in) and soffit vents.

- Doors need weather-stripping........to prevent significant air leakage. The crack around all four edges of a standard door is 20 feet long. If the crack is 1/12" wide, the total "hole" size is 20 square inches, roughly the equivalent of a softball sized hole in the door! If the house is negatively pressured whenever the air conditioner runs because of supply duct leakage (see #33), that size hole admits a lot of warm, moist air for the air conditioner to cool and dry. A wide variety of weather-stripping materials are available at local hardware stores and home supply centers. You'll often find good instructions there too, either from staff or from how-to booklets.

- Windows and doors need caulking........to prevent air leakage, for the same reasons discussed above. This is do-it-yourself work. Caulk is cheap, applying it is easy, but it takes time. Caulk cracks around window and door frames; cracks where masonry walls meet wood siding or trim; wall penetrations by pipes, meter box, dryer vent or exhaust vents, etc. Some all-purpose caulks are silicon, silicon-acrylic and siliconized acrylic latex.

- The garage was converted to a family room.........without insulating the walls or ceiling. Now it's the hottest room in the house, and that's where the TV is located and the family spends the most time. To make it comfortable, the family turns down the thermostat setting for the whole house. Costs rise.

- In the hallway ceiling there's a large whole-house fan with incompletely closed louvers............It provides a major site of air leakage to or from the attic. If you have one of these fans and never use it, you'd do well to seal it from above and drape it with blankets of insulation.

- Old casement or awning style windows are deformed out of alignment and will not seal shut............allowing warm moist air to leak in, or expensively cooled air to leak out.

- The house lacks shade on the east or west sides, or a mobile home sits fully exposed to the sun...........Shade trees can reduce air conditioning costs by up to 30%, and higher if it's a mobile home.

- Windows lack inside shading devices (shades, drapes or blinds), or the devices are not consistently operated............These shading devices are tremendously important. Use them to block heat entry during summer days.

IX. Pools and Spas

- The customer has a swimming pool........and the pool pump runs 24 hours a day. The high cost of pool pumping is a surprise. Most residential pool pumps we see are 3/4 horsepower output. Operated all day every summer day, the monthly energy cost is about $62; operated continuously year around, the annual energy cost is about $745. A timer for the pool pump is well worth the installation cost, and usually pays for itself through energy cost savings within three months or less. The National Spa and Pool Institute recommends that the pool be "turned over" (one complete circulation of water) once a day. Full turnover of a typical 20,000 gallon pool, then, requires 4 hours pumping at 85 gallons per minute, 6 hours at 55 gallons per minute or 8 hours at 40 gallons per minute. Most pool pump systems are sized to accomplish a full turnover in 4-6 hours. Pumping year around for 6 hours a day instead of 24 hours a day saves about $558 a year! Installed cost of a timer is about $80-$120.

- The resident has a hot tub.......and unless careful attention is paid to a tub's cover, insulation and pumping, the added monthly cost can be $20 to $40.

X. Heating and Fireplaces

- Central heat strips turn on, off, on, off ....even when the hallway thermostat is set to OFF. With everything in the house off or unplugged and the water heater switched off at the breaker panel, the meter races, stops, races, stops. Because of a thermostat, control wiring or other wiring problem, the central electric heating strips (10,000 to 20,000 watts) are coming on even though the distribution fan is off and all is silent. Without the fan running, heat from the strips is not distributed. Heat builds up around the strips until a high-temperature safety switch is activated, turning them off. They cool. They come on again.........and so on. Another rare problem like above, but costly when it happens.

- The resident is equipped with a so-called "combination appliance" that uses a gas water heater to heat the water as well as the house (or apartment).........and in summer it keeps on sending heat to the house! Rare, but it happens as a result of failed electronic controls or system valves. Electric and gas costs both increase. The electric cooling cost typically doubles. For the energy auditor, higher than expected summer gas cost is often the telling clue.

- The fireplace damper is open, or there's no damper at all.........admitting outdoor air or losing indoor air. Costs rise in either case, especially if there are HVAC duct leaks, and there usually are. One of our energy auditors took an informal survey of his customers last spring, asking those with fireplaces whether their dampers are closed. Among those who thought it was closed, about 50% were wrong: It's open.

- With a fireplace going, keep doors to other rooms closed – or keep the furnace off until you need it.

- If the thermostat faces a frequently used fireplace, or is close by, move it to the far end of an inside wall or to another room with no alternate heat source.

XI. Miscellaneous

- Residents have waterbeds......but are not careful to make them up each day. That results in significantly increased energy cost! A typical waterbed costs about $10 a month to heat if it's made up each day with heavy covers that hold its heat. If left uncovered the heating cost can double. Smaller water beds cost less to heat than larger: A queen size bed's heating cost is about 22% less than a king size. Whatever the size, it helps to insulate the bed's edges and bottom with polyethylene foam, polystyrene foam or even layers of corrugated cardboard.

- A resident requires the use of oxygen........and unfortunately, the energy cost to run these compressor systems is surprisingly high.

- There's a dehumidifier running nonstop, draining through a hose to the outdoors........and the basement area being "dried" is itself wide open to the outdoors! Admittedly, this is a rare finding, but let's look a little more closely at dehumidifiers. They remove water from the air. So does your air conditioner. But a dehumidifier heats the room in which it sits, just as your refrigerator does! Nevertheless, for some homes it's a very good weapon in the battle against mildew. Have you noticed how dehumidifiers all seem to have about the same size pan for water collection, but have widely different capacities for water removal? The capacities are usually expressed as pints of water removed in a 24 hour period at some standard temperature and humidity. A "bigger" dehumidifier, with a larger compressor and higher operating cost per minute of run time, removes water from the air faster, but generally less efficiently. If you're catching the water in the pan underneath, you'll need to empty it more frequently to keep up. If you're draining via a hose, there's no emptying necessary, but just be sure that the area you're attempting to dry isn't like the one above, open to the outdoors! That was a real finding by one of our auditors. The resident was using a high capacity dehumidifier, the room air was damp as ever and the monthly cost was extraordinary.

- We experience a dry period, maybe in May or June (like the one we are having now).......and water bills rise. It's all that lawn watering. Home lawns are often over-watered. At normal pressure, a 5/8" garden hose delivers about 10 gallons per minute. Thirty minutes of unneeded watering wastes 300 gallons of water! Water waste costs you money and does not improve the health of your lawn.

  A few tips:

  a. The best lawn watering time is a windless, morning period. Avoid watering on windy days.

  b. Wait longer times between watering. Grass roots will grow deeper, less watering will be needed.

  c. Remove weeds before they get large. They steal precious water from desirable plants.

  d. Mow regularly, removing only 1/3 of the grass length. Clippings can remain on the lawn. They help retain moisture.

- Windows on the southwest or west side are fully exposed to the setting sun.......... and they need external and internal shading. In newer Florida homes sun entering the windows accounts for about 20% of the air conditioning load. In older homes, it can be as much as 30%. Use of interior shades, drapes or blinds reduces heat gain across the windows by about 20%. External shade (trees, awnings, sun screens) works even better. Some newer, high tech windows have special tints or films that reduce the amount of heat transmitted across the window into the house. Most window manufacturers now offer high-tech windows with low-E coatings. A low-E coating is a microscopically thin, virtually invisible, metal or metallic oxide layer deposited on a window. In a double paned window the coated surface may be either the outer side of the inner glass or the inner side of the outer glass. In Florida the latter design works better. The coating acts to suppress radiative heat movement across the window by reflecting heat back into the home during cold weather and back to the outdoors during warm weather.

- The electric meter was misread.......high or low. Yes, it happens rarely. Because the meter registers kilowatt hour usage cumulatively, the billing self-adjusts the next month, but not without some momentary alarm for those concerned.

- College students living away from home for the first time move into an off campus house or apartment in August.........and the first utility bill has a way of getting high. It seems to relate to that whirlwind of initial activity that happens to coincide with brutally hot weather: Moving in, cleaning, parties, friends over, door open, thermostat set too low, etc.

- The small pump on a water heating waste heat recovery unit runs nonstop.........whether the air conditioner is running or not. This can get pretty costly, especially if the water heater is a long way from the air conditioner's outdoor condenser.

- There's hot water in the toilet! Six words that mean trouble. For years we teased one of our energy auditors who insisted he had found this – no one believed him. Then two others discovered the same thing.

- The house is very large.........and so is the cost to cool it. There's more volume to heat and cool. Larger homes generally have higher utility costs, all things considered.

- Bad meter........Notice how late on the list this one appears. It's about the last thing an experienced energy auditor suspects to be the problem. How often is an electric meter too fast? It's hard to pry a definitive statement out of the folks in the Electric Department's Meter Shop, but not because they have anything to hide. After a long pause, their answers usually come out like these: "It's mighty rare". "How often is one fast? One in a million? Maybe one in 100,000?". "Once in a blue moon". "There was one a while back that was damaged by lightning, but it was running too slow, not too fast." "Over the past 18 years I can't think of even one meter that tested fast. We've found some slow, or stopped, but not fast". The fact is, most meters run very slightly slower as they get older. When a meter fails, it doesn't speed up, it stops. (By the way this is true for gas and water meters as well.) Here's what happens when you request an electric meter test: Your old meter comes off the wall and a new, recently certified-as-accurate meter takes its place. The old one is returned to the Meter Shop where it's tested by the Electric Department's meter repair technicians. They bench test it on an RFL 5800 Meter Calibration System, a $40,000, state-of-the-art "watt-hour comparator". It's no surprise for older meters to test a shade slow. The old meter is either adjusted and put back in service, or retired.

- "The roomate effect"........Happens to college students in off-campus housing. Each roomate has a different level of thermal comfort and a different level of concern for energy conservation in general. The energy practices of the least concerned and least conserving individual often become the norm for all residents

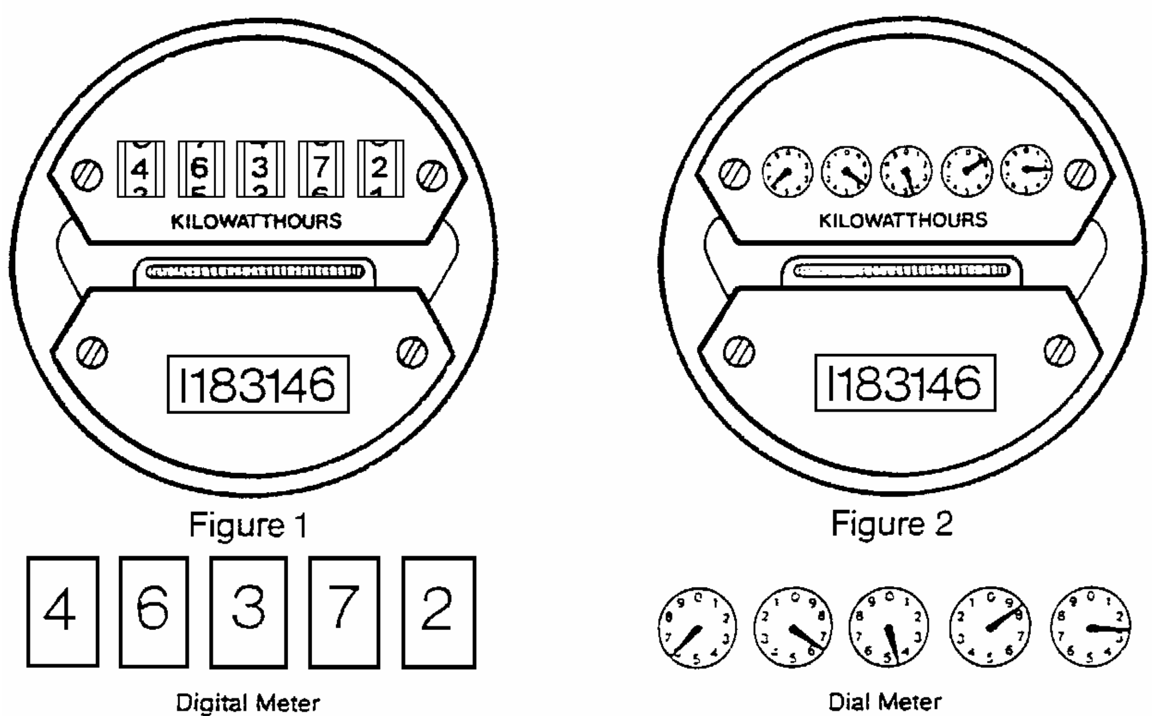
- Office in the home......This is becoming more common. Here's the power draw of some selected home office accessories, taken from a 1993 article in Home Energy:

Equipment Type		
Power Draw		**Active**
(Watts)	**Idle**	400
Copier	6	62
Personal	62	62
computer	62	200
Video Monitor	80	30
Laser Printer	14	
Fax Machine		

How much this costs depends on activity levels. Suppose the copier, printer and fax machine are idle 23 hours and active 1 hour each day: Together with computer and monitor (let's say they are active 24 hours/day), monthly cost is about $15.

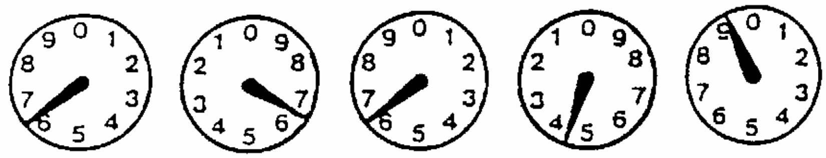
XII. Reading Electric Meters

After you've studied your last electric bill, go outside and find your electric meter. If it's like the one in Figure 1, it's called a "digital" meter. This type of meter is as easy to read as the mileage odometer in your car. Just write down numbers as they appear on the meter.

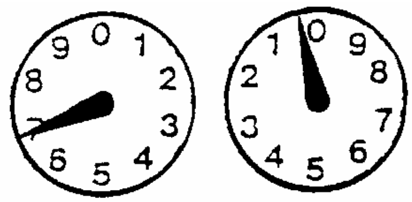


If your meter is like the one in Figure 2, it is called "dial" meter. Notice that all the faces on the dials are numbered 1 through 9, with 0 at the top. Now look closely and you will see that the numbers go around the face clockwise on some of the dials. But on every other dial, the numbers go around counterclockwise. The hands on the dials move in the same direction as the counting order of the numbers on the dials.

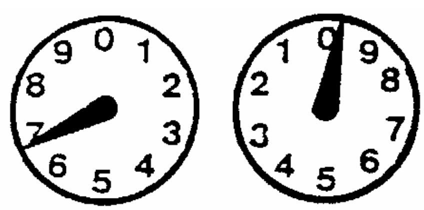
If your meter is like the one in Figure 2, you'll need to write down the number that each hand has just passed. Remember --- some hands move clockwise while some move counterclockwise. To obtain your reading, start with the left-hand dial and proceed right.



There is one more thing to reading your meter. If a hand is directly on a number and you don't know if the hand has passed or not, then do this. Look at the dial to the immediate right. Has the hand passed "0"?



If the dial on the immediate right has passed "0", write down the number the hand on the left is pointing to. in this case "7". The reading of these two dials would then be "70".



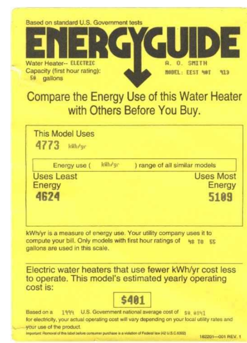
If the dial on the immediate right has not passed "0", write down the number the dial on the left has just passed. In this case "6". The reading of these two dials would then be "69".

XIII. Energy Guide Labels

Appliance labeling was initiated by Congress as part of the Energy Policy and Conservation Act of 1975 and later amended by the National Energy Conservation Policy. The United States Department of Energy and the Federal Trade Commission jointly manage this program.

Energy Guide labels are bright yellow and black for easy identification. They are required on refrigerators, refrigerator/freezers, freezers, air conditioners, clothes washers, dishwashers, water heaters, and furnaces that were manufactured on or after May 19, 1980.

Three types of labels are used. They are; Energy Cost Labels, Energy Efficiency Rating Labels and Generic Labels.



The most widely used is the Energy Cost Label. It is found on refrigerators, refrigerator/freezers, freezers, water heaters, dishwashers and clothes washers.

The Energy Efficiency Rating Label (EER) is used on climate control appliances, such as room air conditioners. The EER on the bar scale should be a high figure. The closer to 10.2 EER the more energy efficient the air conditioner is. This figure is derived by dividing Btu/hr (cooling output) by the watts of power the unit uses. A 12,000 Btu unit rated at 1,350 watts has an EER of 8.8. The highest EER rating saves over 50 percent more energy than the lowest.

Generic Labels are the third type of Energy Guide labels. They are required on all furnaces.

When buying a new refrigerator, here's what to look for:

First, choose the cubic foot size to fit your needs.

Oversized models can be costly. Plan ahead. If your family is still growing, you may need the extra space, but if in a few years the children will not be at home, a smaller model may be the best choice.

Energy Guide labels classify models in cubic foot ranges of approximately two cubic feet. Compare Energy Guide labels of models in the same cubic foot range. Sample Energy Guide label ranges in cubic feet.

12.5 to 14.4	14.5 to 16.4
16.5 to 18.4	18.5 to 20.4

A 17 cubic foot model should be compared with others in the 16.5 to 18.4 cubic feet range.

Next, compare the yearly energy costs and the purchase price.

To find out which model will save you the most money over the life of the appliance, consider both the yearly energy cost shown on the Energy Guide label and the purchase price.

	Purchase Price	Energy Cost
Model "A"	$670	$52
Model "B"	$610	$90

1. Subtract the lower from the higher purchase price: $670 - $610 = $60
2. Subtract the lower energy cost from the higher cost: $90 - $52 = $38
3. Divide the purchase price difference (step 1) by the energy cost (step 2): $60 / $38 = 1.57 years.
   The result shows that Model A's energy efficiency will make up for its higher price in a little more than one and a half years. How much can you save over time?

   Compare models this way:

4. The average refrigerator lasts 15 years; the average separate freezer, 15. Take that life expectancy and multiply it by the difference in energy savings you figured in step 2: 15 x $38 = $570.
   That's the amount you'd save by buying Model A. So, while its purchase price is more, it's clearly the best buy. As energy costs rise, savings will be higher.

<u>Compare defrost systems.</u>

Appliances with and without automatic defrost systems are grouped in the same Energy Guide categories. Automatic defrost models use more energy. You'll have to decide whether or not this convenience outweighs the extra energy cost.