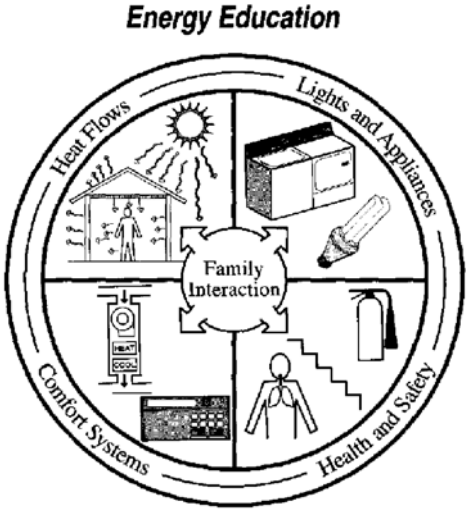
Overton Power Residential Energy Guide

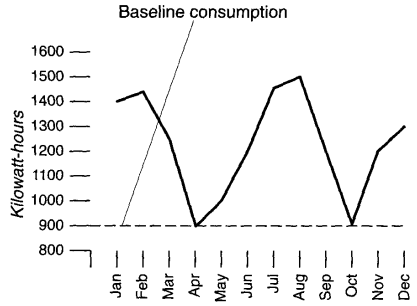
Although the United States only represents about 6% of the world's population it consumes 26% of the energy supplies. Energy consumption has many economic side effects. The United States imports 50% of the oil it uses, making oil our largest import. Importing this oil creates a 20% annual trade deficit over 50 billion dollars per year. In 1990 householders used the equivalent of 40 million tons of coal or 182 million barrels of fuel oil for 9.2 quads of energy. With energy prices at an all time high, and as energy consumption continues to rise among consumers Overton Power has established some common guidelines that if followed may reduce energy consumption and lower monthly energy bills.

Energy consumption is measured in watt-hours. The information provided is designed to allow consumers to maintain a high standard of comfort and also lower the total watt-hour usage in our homes. When energy saving measures are being considered consumers should always evaluate what products will most benefit their needs. Energy saving options vary from household to household and is dependent on lifestyles and the way our homes are constructed.



The goal of energy education is a family's understanding of its relationship with the home's energy systems.

Energy Consumption in an All-Electric Home



This all-electric home shows high energy consumption for both summer air conditioning and winter heating.

Efficiency

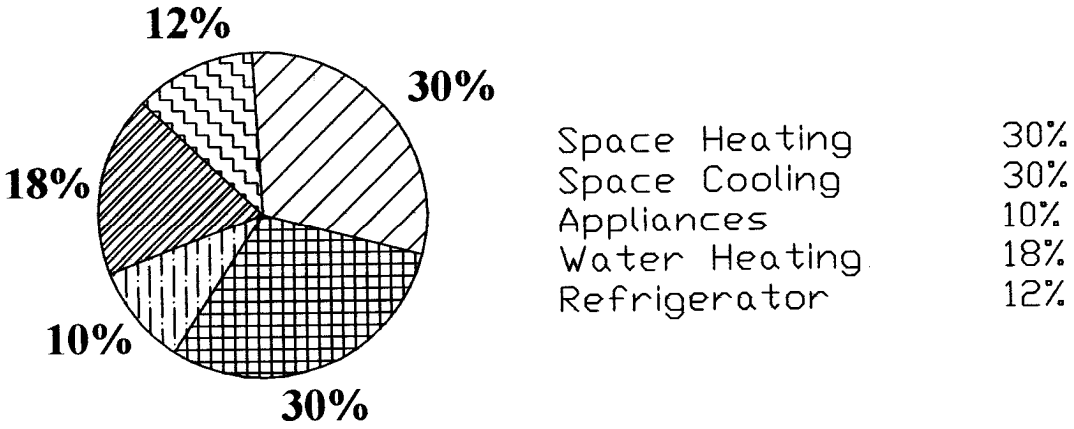
Converting energy from its natural form to our intended use is never completely successful, some energy escapes and is wasted. Efficiency is a term that defines our efforts to reduce the energy waste and provide more economical benefits with less environmental damage.

Energy Consumption

The following list of power consumption is an approximation, based on an average home in a warm climate. The areas below will be of most importance establishing a baseline for energy saving measures.

30% space cooling – 30% space heating – 18% water heating – 12% refrigeration – 10% appliances and lighting

Home Energy Consumption in Warm Climates



Energy and the Building Shell

An ideal building maximizes heat retention during the winter and minimizes heat gains during the summer to reduce energy heating and cooling needs. The best way to achieve this in a new building is by energy efficiency design, planning and construction. In existing buildings, technicians perform modifications called weatherization to reduce heat loss and gain through the building shell. A building shell is comprised of doors, windows, floors, walls, and ceilings. All of these components play part in its efficiency. The key elements to a building shell are its air barriers and insulation or r-value. R-value is the thermal resistance of the shells components. The air barrier is the ability a building shell has to resist unwanted airflow through its components. When maximizing a buildings performance it is critical to control these factors.

Construction procedures vary from state to state. There are two common types of framing. Balloon framing is common in older homes; this type of framing incorporates studs that are continuous from the first story to the second. This method is much harder to insulate and control air flow in the walls. Platform framing is typically used in modern homes. This method has top and bottom plates at each story. Platform framing is much easier to insulate and provides a better air barrier inside the walls, for these reasons it is preferred to other types of framing. Consideration should be given to the type of walls that are to be used in a home; 2x6 stud walls are preferred over 2x4 due to the amount of insulation space provided in the wall cavity. There are numerous other methods of construction that may be used, however you should always consider what's most economical and efficient for your needs.

Insulation

Most single-family homes lose as much as six times of the heating and cooling losses through heat transmission as through air leakage. Insulation slows heat transmission through a buildings walls, floor etc… Insulation also provides reduced size of heating and cooling equipment enhances comfort by reducing temperature variations, reduces condensation by warming interior surfaces. Other benefits include structural strength, reduced noise levels, impede air leakage, and improves fire resistance. Good insulation harbors millions of tiny air pockets within its fibers, heat transmission proceeds slowly having to cross this myriad of slow conducting pockets. Insulation performance is measured in R-value. The higher the R-value the better its thermal resistance, providing it has been installed properly. Insulation is constructed to its optimum density when it is compressed beyond that design or moisture is added it looses R-value. Insulation varies in type and style. Insulation may be applied by numerous methods depending on the application. The following information reflects insulation properly installed in modern construction.

2x6 standard frame wall assembly R-15

2x4 standard frame wall assembly R-10

Ceilings typically have an R-30

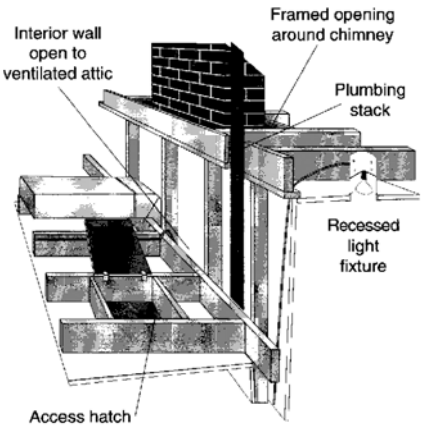
Sub-floors will normally have R-19

Improper installation will greatly decrease R-value. R-value in older homes will vary due to different construction methods. These figures are an acceptable level in newly constructed homes. In the event a home was found to have values lower than the above-mentioned, insulation upgrades should be considered. Properly insulating a home is usually a cost effective way to reduce energy loss. Homeowners should consult a reputable insulation contractor to provide service.

Air Barriers

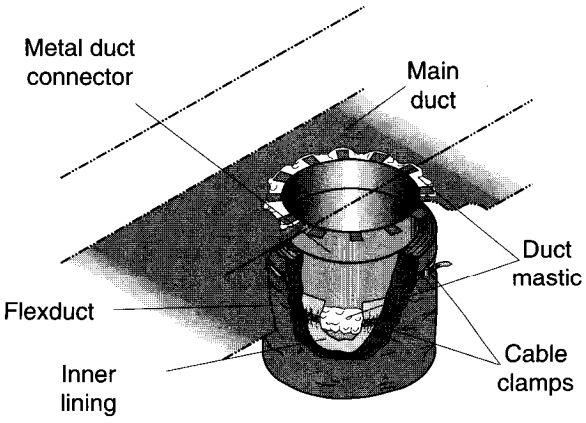
Another important aspect in building efficiency, are its air barriers. The term is associated with the ability a structure has to stop unwanted air penetration through its shell. Air leakage represents between 5% and 40% of space conditioning cost. Buildings are constantly under pressure due to differences between our inside controlled environments and the outside elements.

Air-Leakage Sites



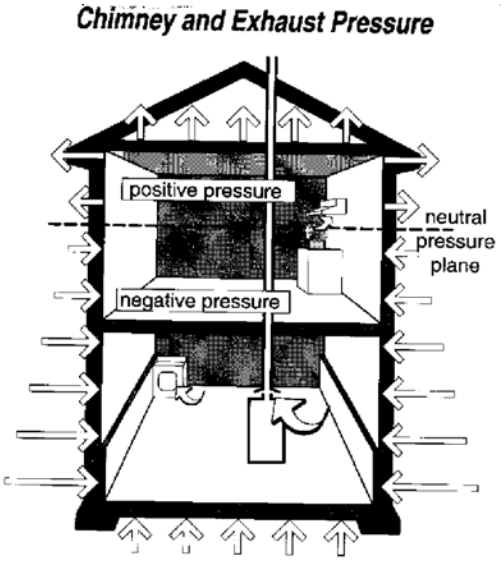
A combination of penetrations and construction details can lead to excessive air leakage.

Sealing Flexduct



A short piece of 10- or 12-inch metal pipe is often used to connect the flexible crossover duct with the main duct. Two cable clamps fasten the flexduct to the metal pipe. Duct mastic seals the inner liner to the metal pipe.

All buildings have air filtration through their envelope, this allows a building to breath and maintain indoor quality. When to much air is allowed to pass through a structure energy is wasted. Poorly sealed doors, windows, electrical outlets, recessed lighting, fireplaces, pet doors, open wall cavity's and structural damage are common examples.

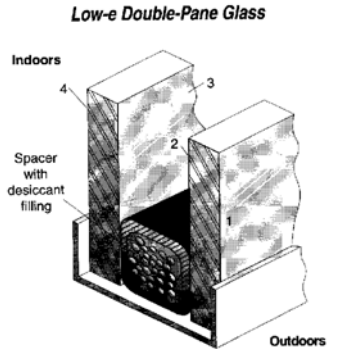


The chimney, clothes dryer, and kitchen exhaust fan exhaust air from the home, putting most of the home's volume under negative pressure.

There are a number of testing methods that aid in tracing airflow in a home. Weatherization technicians perform blower door testing, trace gas analysis, manometer readings and infrared scanners to calculate how airtight a home is. A homeowner may trouble shoot for problems by paying attention to how a home feels in certain areas, rooms that have a noticeable draft or hot or cold sectors. Homes with fireplaces may smell like smoke when a fire has not been burning. Fireplaces are a direct opening to the outside air and can easily be noticed when drying clothes or exhaust fans are creating a negative pressure inside the home. Weatherization of these examples can be of value in reducing energy use. Weatherization products are available in most do it yourself hardware stores and include products like weather-stripping, caulk, mastic, dense pack insulation and polyurethane foam. Weatherization, when done correctly can produce an impressive result in a homes performance.

Windows

Windows are often the weakest link for heat transmission through a buildings shell. Windows are rated by U-factors. A windows solar heat gain or heat loss is determined by this number. Solar heat gain can account for up to 40% of the total heat removed by an air conditioner. Good windows will have a low U-value this value is the inverse of R-value.



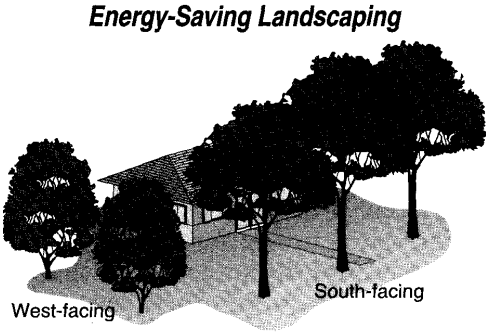
Double-pane glass has a sealed spacer between the two glass panes. A low-e coating on one pane retards emission of radiant heat from that pane. In warm climates, the coating is located on surface #2. In cold climates, the coating is located on surface #3.

Single glass has a 1.1 u-factor or r-value of .9.
Insulated glass has a 1.1 u-factor or r-value of 2.0
High SHGC low-e insulated glass has a u-factor of .30 or r-value of 3.3
Medium SHGC low0e insulated glass has a u-factor of .29 or r-value of 3.8
Low SHGC low-e insulated glass has a u-factor of .26 or r-value of 4.2
Triple glazed two low-e coatings has a u-factor of .12 or r-value of 8.3
SHGC is the Solar Heat Gain Coefficient. In warm climates windows should be installed to minimize SHGC. Low-e coatings are used to resist heat radiation. These coatings are applied on the inner pane for heating dominant climates and on outer pane for cooling dominate climates. Special gasses are used to increase the r-value between panes, which slows convection. Proper installation is key in a windows ability to seal off the outside air. Window treatments are sometimes a cost effective way to improve window performance. These treatments include solar screens, interior storm glazing, awnings, blinds and shutters. Interior blinds greatly reduce the amount of heat gain, when installed in a dominant cooling climate. Two criteria should be considered when upgrading windows; does the upgrade benefit the value of the home and is the energy savings enough to be cost effective? Good windows reduce energy usage and in many cases provide added comfort in a home.

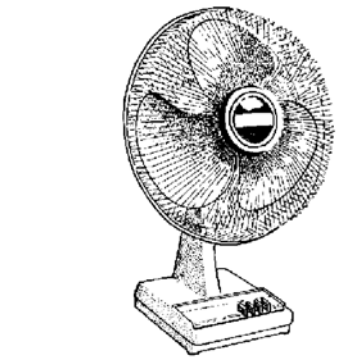
Cooling

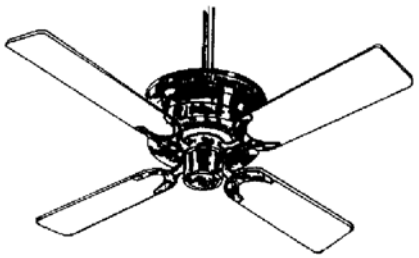
The older methods of cooling shaded buildings made them reflective and ventilated them with cool night air. Refrigerant air conditioning revolutionized cooling in the southern United States however it is costly and environmentally questionable. Modern cooling accounts for the majority of energy usage in the summer months. Air conditioners have an efficiency rating called SEER or EER. Air conditioners with higher SEER rating will cost more but will also return initial investment several times over its life. SEER ratings range from 4.5 to 17. Replacing a vintage 1970's 6 SEER units with a modern 12 SEER will cut energy cost in half. The capacity a unit has to remove heat from a building is measured in tons; one ton per 400 square feet of living is a standard rule of thumb when estimating size requirements. Contractors often oversize by 30% to make certain a home has adequate cooling capability. In energy efficient homes 700-1200 square feet per ton is commonly used and can produce better efficiency and humidity control. These numbers reflect a properly instated high SEER system. A number of other important factors affect the way air conditioners work such as clean filters, unrestricted airflow, adequate return sizing, proper unit maintenance and thermostat location. Quality programmable thermostats are very helpful in lowering energy usage. Thermostat settings around 80 degrees will considerably aid efficiency. Leaving interior doors open or venting them is effective in reducing negative return pressure, high density air filters also put phantom load on the return by restricting air flow. Proper refrigerant levels should always be maintained. 66% of units in operation on a national scale are not charged correctly causing efficiency variations. A reputable contractor will size and install units correctly by careful calculation and computer programs. A publication by the ACCA. Air Conditioning Contractors of America, called The Manual J. has a complete procedure of proper sizing. Homeowners can call manufactures with model numbers and acquire specifications and efficiency information if needed.

Planting shade trees may be used to protect highly solar heated areas of a building. Trees can lower air temperatures up to 9 degrees while increasing a homes resale value between 7% and 20%. Studies by the U.S. Department of Energy report a 25% increase in tree cover will lower a city's mid afternoon July temperature by 6 degrees. Lawrence Berkeley Laboratory found summer daytime temperatures 3 to 6 degrees cooler in neighborhoods with mature tree canopies. These statistics and others prove planting trees are 10 times more cost effective than building new power plants. Ceilings fans force air to move inside the home, air passing by the skin cools the body, thus requiring less conditioned air to maintain comfortable levels. Ceiling fans use little energy compared to air conditioners and may be installed in any rooms that are occupied.



Landscaping is the best long-term cooling investment for residences. Southern exposures need taller trees to block the higher angle of the sun from the south. East and west vegetation should block the lower-angle sun from entering windows during the summer.



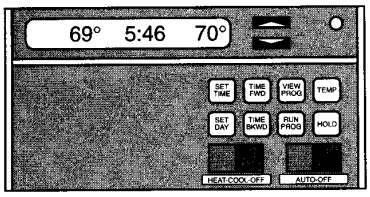


Floor fans, table fans, and ceiling fans are the most cost-effective electric cooling devices available. They should be used to create a wind-chill effect while whole-house fans, evaporative coolers, and air conditioners are in use.

Heating

Delivered heating efficiency runs about 35-95%. Delivered heat is the heating systems useful heat output divided by the energy input into the heating system. Electric resistive heat is 100% efficient, except for the distribution losses. Heat pumps are a special type of electric heat units that move warm air from outside to inside. These units run up to 100-400% effective due to their ability to move more heat than their equivalent usage. These figures vary due to the outside temperature, proper installation, duct leakage, and proper maintenance. Other factors affect the performance such as automatic setback thermostat, variable stage motors emergency heating strips and insulated ductwork. Electric room heaters can reduce energy usage if isolated rooms are being heated and lower thermostats setting are used on the central system. Electric heat is the primary source of heat in the southwestern climates; however geothermal heating is becoming popular. This method takes heat from the ground and transfers it to the home; it also is very efficient yet somewhat cost prohibiting. A close inspection of your existing equipment can be of benefit in finding leaky ducts, dirty filters, and other problems that can easily be fixed. For technical service work contact a reputable technician.

Automatic Thermostat



Automatic thermostats, which allow for two setback periods, work well for occupants with regular schedules, and particularly well for occupants who are gone during the day. Expect savings of 5% to 20% from 5°F to 15°F setbacks.

Water Heating

Water heaters use energy in three ways: demand, standby, and distribution. *Demand* is energy needed to heat incoming water. Demand energy is determined by the efficiency of the heating device, plumbing fixtures, and occupant use. *Standby* energy accounts for heat loss through tank walls. Standby losses amount to 20%-60% of total water heating energy. Homes using less hot water have greater standby losses.

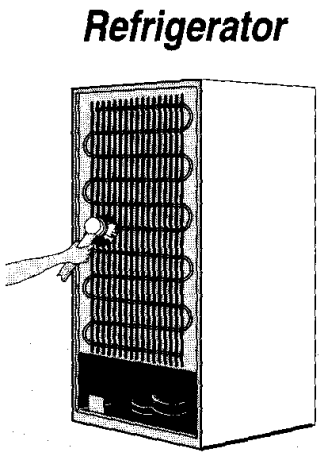
Distribution loss is heat escaping through pipes and fixtures while water flows through them. Pipes near the water heater loose heat even when water isn't flowing due to heat rise from the tank that cools in nearby pipes then falls back down in tank.

Energy saving devices, like tank insulation, water saving showerheads, heat taped piping, lowering temperature settings to 115-120 degrees, automatic time controls, and heat traps are good ways to aid efficiency. When purchasing a new unit use energy guide rating to select a high efficiency heater. Water heater maintenance is crucial to operating efficiency. Water born minerals create scale and corrosion inside a water heater this scale is measured in gains per gallon. Sacrificial anodes provide something for the water to corrode instead of the tank. With soft water anode replacement is needed every 2 to 3 years with hard water replacement should be every 4 to 5 years. Lowering water temperature will greatly increase your tank life as well as decrease the amount of sediment in a tank. Water at 160 degrees will deposit 10 times more scale than water at 120 degrees. Heater elements become covered in scale, which cause inefficiency's and burn out in heating elements. Tanks should be cleaned regularly to remove scale buildup. Salt softened water treatment reduces scale, however may be a health problem for people with high blood pressure. This treatment is also very corrosive on sacrificial anodes and requires added maintenance. When tank scale becomes a maintenance requirement, white vinegar and proper flushing may be used to remove sediment.

Refrigeration

Refrigerators are large energy users due to the fact they operate 365 days a year 24 hours a day. Modern units have been greatly improved by better insulated, weather stripping, more effective controls, bigger coils, and much more efficient motors. When purchasing a new fridge or freezer look for the EPA energy star rating. The most efficient standard models that use only 300 kw per year. Automatic defrost units waste energy, select a manual defrost option. Side by side models are less efficient than top to bottom compartments. Upright freezers use more energy than chest models. Operating two small units instead of one large unit is also less efficient.

The way individuals use Refrigerators can make as much or more of a difference that their design character. Keeping freezers as full as possible greatly increases efficiency. Always defrost a unit when ¼ inch of frost has accumulated. Minimize door opening. Clean coils once a year. The best solution it to replace older models with new efficient models.



Cleaning refrigerator coils is always a good idea. However, the best long-term solution to excessive energy consumption is to replace old refrigerators with energy-efficient new ones.

Appliance and Lighting

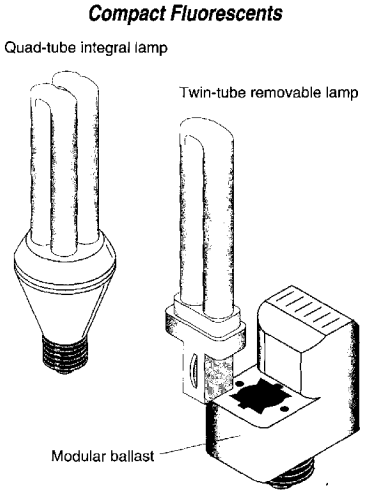
Appliances account for a much smaller portion of our energy consumption. There are a number of areas that will aid in conservation. Cooking appliances vary in efficiency, microwave ovens are good for small meals, convection ovens are efficient, electric skillets are much more efficient than electric range, lids on pot and pan reduce cooking time, defrosting frozen foods in refrigerator before cooking aids in conservation. Using an outside barbeque during summer months keep unwanted heat from other cooking methods out of the home.

Vertical axis clothes washers use far more energy and water than horizontal axis machines. 50% to 75% of energy and water savings can be achieved in this area. Washing machine with horizontal axis cost double what vertical machines do expected return on investment is between 3 to 6 years. Washing clothing in cold water is often a good solution in conserving energy. Enzymatic detergent designed for cold water provides excellent results. Some washers perform as well with cold water as they do with warm or hot water. Sud saving cycles can also be of benefit. Washing full loads use energy most efficiently.

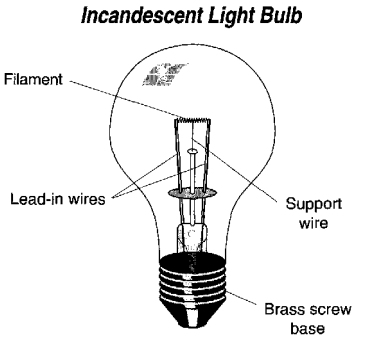
Clothes' drying is another area of possible energy savings. The average cost of drying a batch of clothes is 10 times higher than washing. Humidity sensing dryers can aid by not over drying clothing. Good dryer ventilation and full loads will also help reduce energy use. Drying clothes on cloths line is the best method for conservation especially in warm climates.

Dishwashers mainly add energy usage by way of hot water. Full loads help reduce waste. Using settings that don't require a heated drying cycle will also aid.

Lighting can be broken down into four basic types: *Incandescent*, *Fluorescent*, *High Intensity Discharge*, and *Low-Pressure Sodium*. Incandescent lights are the oldest, most common and inexpensive lamps, they also have the shortest life span and utilize the most energy. A standard incandescent bulb operates 95% efficient as a heater and 10% efficient as a light source. In residential housing these types of lights contribute to only a small portion of energy usage, however there inefficiency's add up with unwanted heat and waste energy that has to be removed from the home by cooling. Fluorescent lights are approximately three or four times more efficient and ten times longer lasting than incandescent. CFLs Compact fluorescents are a good choice for upgrading existing standard bulbs. They come in various configurations and are a very efficient lighting source. A standard 75-watt bulb can be replaced with an 18 watt CFL. Flood and spot light application also be accommodated by CFLs. Other types of lighting like high intensity discharge and low pressure sodium are the most efficient man made light sources available but renders all colors in yellow or gray and can only by beneficial where color isn't important or large areas are being lighted. Relamping with energy efficient bulbs has proven beneficial in conservation, however energy efficient bulbs are expensive and long-term paybacks should be expected.



Compact fluorescent lamps (CFLs) come in integral or modular designs. The tubes are twin-tube or quad-tube designs. CFLs screw into incandescent fixtures and save up to 75% of the electricity.



The electric circuit in the incandescent light bulb starts at the base, travels through the lead-in wires and filament, and back to the base. One lead-in wire is soldered to the base's center bottom, and the other to the brass rim.

Summary

Energy conservation is more than ever an important part of our society. As demand grows and environmental impact affects the way we use our resources it becomes everyone's responsibility to participate in conservation. Take the time to review the measures that can limit the amount of energy you use. Energy conservation starts as a state of mind and projects into our homes and businesses resulting in financial savings and a better way of life for the future.

Thanks,

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