Energy conservation in the home

by L. Walker[1]

Quick Facts...

- The average house uses 38 percent of its total annual energy use on heating.
- When a house is occupied, the thermostat should be set at 65 to 68 degrees F for maximum energy efficiency.
- Install a central air conditioning system only when whole house air conditioning is needed.
- A sun tempered superinsulated home uses passive solar design concepts with superinsulation construction techniques.
- Replace aging appliances with newer energy efficient models.

When comparing an average house to an energy efficient house, it's possible to reduce annual energy bills up to 40 percent. Prudent homeowners should consider developing an energy conservation plan for their home. This is both an environmentally friendly and economically sound action.

In developing an energy conservation plan for your home, use the following approach: identify the problem areas where energy is being lost or inefficiently used; prioritize the problem areas according to how much energy is being lost or inefficiently used; and systematically correct the prioritized problems according to the limits of your household energy improvement budget.
The average house uses energy for the following tasks (with percent of annual energy use noted).

Heating	38 percent
Hot Water	19 percent
Major Appliances	21 percent
Other Appliances	15 percent
Lighting	7 percent

As you develop your home energy conservation plan, the first task is to identify problem areas. The above list of household energy uses suggests a place to start – the higher energy uses (i.e. heating) have the greatest potential for savings. Review the energy conservation measures checklist below to identify problem areas in your home.

The checklist describes energy conserving measures according to energy use tasks. Under each task is a list of energy conserving actions prioritized by their cost effectiveness. Review the items on the list and compare them to the present

situation in your home. You may already be implementing some of these measures, so use the items below to help you identify other strategies to further develop your plan.

Heating

- Set your home thermostat as low as comfortable (65 to 68 degrees F is suggested) when the house is occupied.
- Set back the thermostat by as much as 10 F at night or when the house is unoccupied during the day.
- Set back the thermostat to 50 to 55 F when the house is unoccupied for over 24 hours.
- Install a programmable thermostat to automatically provide the setbacks mentioned above.
- Close the fireplace damper – except during fireplace use.
- Reduce heat to unused rooms in the house – close doors and heat registers too.
- Close curtains and shades at night.
- Replace furnace filters once a month during the heating season.
- Remove any obstructions and clean heating registers regularly.
- Have certified maintenance personnel service and check your furnace regularly – every three years for gas fired furnaces.
- Seal all joints in sheet metal ducts in a forced air furnace with mastic or appropriate tape; insulate ducts passing through unheated spaces.
- Minimize the use of kitchen, bath, and other ventilating fans or install a timer switch on them.
- Install insulating gaskets behind electrical outlets and switch plates on exterior walls.
- Caulk and weatherstrip doors and windows.
- Caulk and seal leaks where plumbing, ducting or electrical wiring penetrates through exterior walls, floors, and ceilings.
- Upgrade ceiling insulation to R-38 (higher R values mean greater insulation levels and thus more energy savings).
- Insulate exterior heated basement walls to at least R-11.
- Insulate floors over unheated areas to R-19.
- Install storm windows over single pane windows.
- Replace aging furnace, when needed, with an energy efficient model.
- Replace single pane windows with energy efficient double pane windows mounted in non-conducting window frames.

Hot Water

- Repair leaky faucets.
- Reduce the temperature setting of your water heater to warm (120 F).
- Add an insulating blanket to your water heater.
- Install low-flow showerheads.

 Wash clothes in warm or cold water using the appropriate water level setting for the load.
 Replace water heater, when needed, with an energy efficient model.

Major Appliances and Other Appliances

- Maintain refrigerator at 37 to 40 F and freezer section at 5 F.
- Maintain stand alone freezer at 0 F.
- Choose a refrigerator/freezer with automatic moisture control.
- Use toaster ovens or microwave ovens for cooking small meals.
- Adjust the flame on gas cooking appliances so it's blue, not yellow.
- Replace a gas cooking appliance with a unit with an automatic, electric ignition system.
- Run the dishwasher only with a full load of dishes.
- Air dry dishes in a dishwasher.
- Regularly clean the lint filter on your dryer and inspect the dryer vent to ensure it is not blocked.
- Shut down home computers when not in use.
- Select appliances (i.e., curling irons, coffee pots, irons) with time limited shut off switches.
- Replace aging major appliances, TVs and VCRs when needed, with energy efficient models. Compare the annual energy consumption and operating cost for each appliance by looking at the bright-yellow and black Energy Guide label when shopping for new appliances.

Lighting

- Turn off lights when not in use.
- Use task lighting whenever possible instead of brightly lighting an entire room.
- Install compact fluorescent lamps in the fixtures which receive high use.

Now you have reviewed the above items in the checklist and marked those you need to address. The next step is to prioritize these items according to their cost and appropriateness for your situation and lifestyle. Next, refine your home energy conservation plan using these prioritized items as a guide. Finally, implement the plan as time, your energy, and budget allows.

Cooling

While the above items are the main energy users in a house, in certain parts of Colorado keeping a house cool in an energy conserving manner also needs to be addressed. Consider adopting the following energy conserving cooling measures, as well as the heating measures listed above, in developing your home energy conservation plan.

- Open windows at night to bring in cool night air; close them during the day.
- Close drapes during the day.
- Shade west facing windows.
- Draw cool night air into the house with a whole house fan.
- Install an evaporative cooler.
- Use room air conditioning only where needed and install energy efficient models.
- Install a central system air conditioner only when whole house air conditioning is needed.
- Maintain an air conditioned house at 78 F or higher.
- Regularly change air conditioning system filters and clean the condenser.
- Plant deciduous shade trees on the west and south sides of your house.

Sun tempered superinsulated (STS) homes

If your considering buying or building a new house, you might want to incorporate concepts found in a sun tempered superinsulated (STS) house. A STS house uses passive solar design concepts with superinsulation construction techniques. Colorado's cold but sunny climate is well-suited to an STS house. Elements in an STS house include: solar orientation; increased insulation levels; effective air/vapor barrier; controlled ventilation; and energy efficient window treatment.

Solar Orientation

- Orient main activity rooms and windows to the south.
- Locate patios and decks on the south side of the house.
- Properly shade south exposure with roof overhangs and correctly placed shade trees to provide summer comfort.

Increased Insulation Levels

- Superinsulate walls using 2" x 6" framing, R-19 insulating batts, and a layer of rigid insulation over the exterior wall framework.
- Insulate ceilings to R-40.
- Insulate foundation walls with exterior rigid board insulation.

Effective Air/Vapor Barrier

- Install a continuous impervious membrane on the inside of exterior walls with no breaks; seal all penetrations with gaskets and caulk.

Controlled Ventilation

- Install an air-to-air heat exchanger to control ventilation rates in the house.

- Use a furnace and water heater that draw combustion air from the outside.

Energy Efficient Window Treatment

Use this STS checklist to compare house designs you are considering building or buying. The STS measures add only a small increase to the overall house cost and will be paid back many times in lower energy bills and increased comfort.

- Minimize windows on the north and west walls of the house.
- Reduce window areas to eight percent of the floor area of the house.
- Install window frames made of a non-conducting material.
- Install double-paned windows treated with low emissivity (“Low E”) coatings.