



ENERGY

Energy Conservation in the Home no. 10.610

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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 68 F for maximum heating 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 ENERGY STAR models.

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When comparing an average house to an energy efficient house, it is possible to reduce annual energy bills up to 40 percent. Prudent homeowners and renters 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.

A good way to find out where energy loss is occurring is to conduct an inspection. First, close all exterior doors, windows, and fireplace flues and turn off any gas burning appliances and water heaters. Second, turn on all exhaust fans and use floor or window fans to pull air out of rooms in your house. Finally, search for air leaks in the following places: attic hatches, baseboards, corners of rooms, cracks, doors, fireplace dampers, mail slots, outlets, outdoor faucets, switch plates, and windows. Simply dampen your hand and place it by the suggested locations. Your hand will feel cold near a draft. Another method is to light a stick of incense and hold it near the suggested locations. If the smoke from the incense wavers you have found an air leak.

Heating

- Set your home thermostat as low as comfortable (68 F is suggested) when the house is occupied.
- Set back the thermostat by about 8 degrees 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, and open them on sunny winter days.
- 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.
 - 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.
- Use an inexpensive door sweep to reduce air leakage under exterior doors.
- Seal small holes around water pipes and stuff insulation into larger holes around plumbing fixtures.
- Use foam gaskets that fit behind cover plates to reduce heat loss around light switches and electrical outlets.
- 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 ENERGY STAR 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 wrap to an older model. For a newer model, check your owner's manual.
- Install low-flow showerheads.
- Upgrade to a low-flow toilet.
- 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 ENERGY STAR model.

ENERGY STAR is a national program from the U.S. Environmental Protection Agency and the U.S.



Department of Energy. The program includes a system that rates furnaces, water heaters, major appliances, and electronics such as televisions and computers based on energy savings and carbon emissions. ENERGY STAR'S website (www.energystar.gov) includes the ratings as well as suggestions for energy efficient home improvements and buying an energy efficient new home. Look for the label when making purchases.

Major Appliances and Other Appliances

- Maintain refrigerator at 35 to 40 F and freezer section 0 to 5 F.
- Maintain stand alone freezer at 0 F.
- Choose a refrigerator/freezer with automatic moisture control.
- Keep your refrigerator door closed whenever possible.
- Regularly clean dust out of the coils behind or under your refrigerator with a tapered appliance brush.
- Minimize freezer ice build-up.
- Use toaster ovens or microwave ovens for cooking small meals.
- Adjust the flame on gas cooking appliances so it is blue, not yellow.
- Replace a gas cooking appliance with a unit with an automatic, electric ignition system.
- If you have a newer dishwasher, skip pre-rinsing the dishes.
- 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, or put them in sleep mode when not in use.
- Select small appliances (i.e., curling irons, coffee pots, irons) with time

limited shut off switches.

- Plug small electronics into a power strip so you can turn them off at the same time.
- Replace aging major appliances, TVs and DVDs 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 that receive high use.
- Control outdoor lights with sensor timers so they stay off during the day.
- String LED lights during the holidays.

Now you have reviewed the above items 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.



Caulking Tips:

- 1. Remove old caulk or paint and apply caulk to a clean, dry surface.*
- 2. Hold the gun at a 45 degree angle and apply caulk in a straight, continuous line.*
- 3. Send caulk to the bottom of an opening to avoid bubbles.*
- 4. Release the trigger before pulling the gun away to avoid applying too much caulking compound.*
- 5. Apply caulk to all joints in a window frame and the joint between the frame and the wall.*
- 6. Make sure the caulk sticks to both sides of a crack or seam.*
- 7. Remove excess caulk with a putty knife.*
- 8. Reapply caulk if it shrinks overnight.*

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 your blinds and 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 an ENERGY STAR 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.

For both heating and cooling purposes, caulking can result in major energy savings. The cracks and gaps around your home can be filled with caulk to prevent air from leaving or entering it. You can use caulk to close gaps along the baseboard, gaps around windows and doors, and cracks in your walls, corners, ceiling, and floor. The process is simple and inexpensive.

Sun Tempered Superinsulated (STS) Homes

If you are 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 a STS house.

Resources

Amann, J.T., Wilson, A., & Ackerly, K. (2007). *Consumer guide to home energy savings*. Gabriola Island, Canada: New Society Publishers.

Consumer Reports. (2006). *Reducing energy costs*. Washington, DC: Consumers Union.

Energy Star, www.energystar.gov

U.S. Department of Energy, www.energy.gov/energyefficiency/buildings.htm

Xcel, www.xcelenergy.com/residential/saveenergy_money

Elements in a 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

- 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.

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.

Colorado State University Extension's website (www.ext.colostate.edu) contains additional information on energy conservation for homes. Once you are on the site, click "Family, Home and Consumer," then "Online Publications," and finally scroll down to "home." There you will find the following three fact sheets: *The Sun-Tempered Superinsulated House*, *Energy Checklist for Homeowners*, and *Energy Checklist for Renters*.