

Practical Cooling Strategies for Your Colorado Home

Central air conditioning is becoming standard equipment in many new homes, but the majority of Colorado homeowners along the Front Range continue to rely on cool arid evenings to get through the summer. Whether you have air conditioning or not, here are some practical cooling strategies that will help you reduce your energy bill and stay cool.



This home stays cool in summer and warm in the winter, rarely rising above 80 degrees Fahrenheit or falling below 55 degrees Fahrenheit, with no added air conditioning or heating.

Start by keeping the heat out. Roughly 33% of unwanted heat comes through the roof, 40% through windows and 27% from appliances, lighting and indoor activities. A professional energy audit will pinpoint your home's air leaks through windows, doors and cracks and help you prioritize your purchases. You can find a certified auditor (Home Energy Rater) at www.energystar.gov. ENERGY STAR[®] is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. The program helps consumers save money and protect the environment through energy efficient practices and products.

Here's how to avoid heat buildup.

- Insulate your house to recommended levels.
- Seal air leaks including leaky air ducts; and close all windows and doors tightly when temperatures are higher outdoors than indoors.
- Shade windows facing east, west and south. Shades block out direct sunlight as well as radiated heat from the outdoors.
- Landscape with deciduous trees. They will provide shade in the summer and allow the sun to warm your house in the winter.
- Replace windows and appliances with Energy Star products.
- Replace incandescent lights with efficient compact fluorescent ones.
- Avoid using the oven. Prepare meals on a stovetop, in a microwave oven, or cook on an outdoor grill.
- Vent your dryer to the outside and use spot ventilation fans when washing laundry, cooking and bathing. Launder with cold water.
- Finally, reduce activities that generate a lot of heat such as running a computer and a dishwasher and using hot devices such as curling irons or hair dryers. Even stereos and televisions will add heat to your home.

Ventilation is an inexpensive and energy-efficient way to cool your home. Ventilation works best when combined with methods that avoid heat buildup and supplemented with ceiling, window or whole-house fans.

Ceiling fans are considered the most effective. If you use air conditioning, a ceiling fan will allow you to raise the thermostat setting about 4 °F with no reduction in comfort.

During warm weather, ceiling fans may allow you to avoid using your air conditioner altogether.



This Colorado Habitat House incorporates passive solar design to keep in warm in the winter and cool in the summer. It is super insulated and tightly constructed. The home is equipped with a solar water heating system and a substantial PV array. The PV array is grid connected and sized to produce excess energy in the summer to balance out the energy it uses in winter -- leading to net zero energy consumption.

Window fans are best used in windows facing away from prevailing winds. Windows near cooler, shaded outdoor areas provide the best intake air.

A whole-house ventilation fan can substitute for an air conditioner. Whole house fans pull cool air through the house and exhaust warm air through the attic. They are effective when operated on cool nights. ENERGY STAR fans move air 20% more efficiently, on average, than standard models.

If you're replacing an old air conditioner look for an ENERGY STAR model with a seasonal energy efficiency ratio (SEER) rating of 14 or greater. SEER measures an air conditioner's cooling efficiency; the higher the SEER number, the more efficient the unit.

Two types of cooling systems are common in Colorado: evaporative coolers and central air conditioning. An evaporative cooler works well during Colorado's hot, dry summers. These units cool outdoor air by evaporation and blow it inside the house. Evaporative coolers cost about half as much to install as central air conditioners and use about a fourth of the energy.

Central air conditioners circulate cool air through a system of supply and return ducts. Supply ducts and registers carry cooled air from the air conditioner to the home's interior. This cooled air becomes warmer as it circulates; then flows back to the central air conditioner through return ducts and registers. Today's air conditioners use 30% to 50% less energy than those made in the mid 1970s. Even if your air conditioner is only 10 years old, you may save 20% to 40% of your cooling energy costs by replacing it with a new, more efficient model.

A tight house that is well insulated can get by with a much smaller air conditioner or evaporative cooler than typically prescribed. Before installing either, verify that it is sized correctly for the size and characteristics of your house. This is critical to optimizing efficiency, comfort, and maintenance and operating costs over the life of the system. A mistake commonly made by contractors is over sizing. When the unit is too big, it cycles on and off frequently causing indoor temperatures to fluctuate more. This makes the new system more expensive to install and forces it to operate inefficiently, break down more often, and cost more to operate.

Hire a contractor who will do the calculations for cooling loads based on the insulation properties (R-values) in walls and ceilings. To find a certified contractor who will design a cooling system to the specific conditions of your home go to: Air Conditioning Contracts of America (www.acca.org) or North American Technician Excellence (www.natex.org/).

The location and condition of the air ducts is also critical to energy efficiency. For maximum efficiency, the air ducts should be well sealed and located in a conditioned space. If they are in an unconditioned space such as an attic or crawl space, additional insulation should be added. An energy auditor can advise on the optimum R value.

If you are designing and building a custom house, why build a passive-solar one? A passive-solar home is not only warmer in the winter, it's cooler in the summer. A commonly asked question is: "Does the house overheat in the summer with all those windows?" The answer is: "No." If the house has properly sized overhangs, the sun's high, vertical arc will create a long shadow along the face of the south wall – preventing sunlight from reaching the house's interior. With the windows fully shaded for most of the day, the summer solar gain is very low. For more information on passive solar design, go to the National Renewable Energy Laboratory Buildings Web site (www.nrel.gov).

Whatever style you prefer – passive solar or conventional – you can still design an energy-efficient home, using what's called a whole-house systems approach. This approach incorporates the energy efficiency strategies discussed in this article in addition to properly designed and sized components that work together for maximum energy savings. Builders and designers who use this approach recognize that the features of one component in the house can greatly affect other components, which ultimately affects the overall energy efficiency of the house.

A whole-house systems approach can also incorporate small renewable energy systems that generate electricity such as solar panels or small wind machines. Although it takes time and money to research, buy, and maintain a system, many people enjoy the independence they gain and the knowledge that their actions are helping the environment.

Solar panels can supply some or all of your electricity needs. Some people, especially those in remote areas, use the electricity from their systems instead of electricity supplied by utility companies. These are stand-alone, off-grid systems. Others connect their systems to the grid to reduce their use of conventional power. A grid-connected system allows you to sell excess power produced back to your power provider.

Before you purchase and install a renewable energy system, analyze your electricity loads to see if it can meet all or enough of your electricity needs to be economically feasible. You will also want to research your local codes and requirements for installing a system. Tax credits and rebates may offset the cost of your system as well as other energy-saving products.

The time for energy efficiency has never been better. There are more products and information resources than ever before to help you reduce your energy bill and stay cool this summer.

Learn more.

- U.S. Department of Energy, Consumer's Guide to Energy Efficiency and Renewable Energy: www.eere.energy.gov/consumer/
- Department of Energy, Building America: www.eere.energy.gov/buildings/building_America
- ENERGY STAR: www.energystar.gov
- E-STAR™ Colorado: www.e-star.com/general/resources.html
- National Renewable Energy Laboratory: Buildings Research www.nrel.gov/buildings/passive_solar.html
- Rebates and tax credits: www.xcelenergy.com/ and www.energytaxincentive.org

**Employee(s) of the Midwest Research Institute under Contract No. DE-AC36-99GO10337 with the U.S. Dept. of Energy have authored this work. The United States Government retains and the publisher, by accepting the article for publication, acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for United States Government purposes.