

Solar-Smart Design

Working With the Sun

Sunshine is abundant in Colorado. A little thought toward your home's orientation, windows and shading will pay off with better comfort and lower energy bills in all seasons. Other solar strategies may make sense, short-term or long-term.



Have You Experienced...

- Too much glare from your windows?
- Too much heat through your windows?
- Rooms on the south that are too warm while north rooms are chilly?
- Fading upholstery, carpet or artwork?

These can all be symptoms of a home that was designed without enough thought about the sun.

Avoiding Too Much Sun

The sun is powerful, and it's easy to get too much of a good thing. Many homeowners spend a lot of money trying to deal with excessive heat and glare after they move in. Half of a summer air conditioning bill may be due to solar heating through windows. When choosing a new home, consider these strategies to avoid problems with too much sun:

- **Orientation.** Choose a home with most window area on the north and south sides.
- **Window sizing.** Beware of too much heat and light from large expanses of windows.
- **Shading.** Be sure windows are protected from the summer sun. Exterior shading is easy on south-facing windows, not an issue for north-facing windows and more challenging for other orientations.



December



June

- **Solar-control windows.** If windows won't have adequate shading, specify windows with coatings that allow less of the sun's heat into the home. See [Windows](#).

Because the sun's path changes during the year, even relatively short exterior overhangs can provide appropriate shading for south-facing windows. Sunlight can stream in during the winter (top), while most of the sun's heat is blocked mid-summer (bottom). Different solutions are needed for windows facing other directions.

Capture the Opportunities

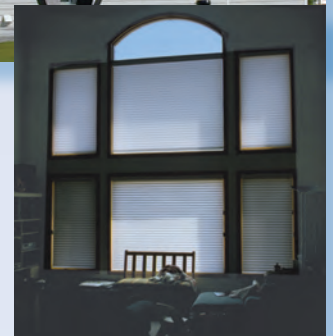
A "solar-smart home" is one that works with the sun. It can provide many benefits:

Comfort. You'll experience more uniform temperatures throughout the house, a cooler home during the summer and less glare.

Health. Many people feel better when they have access to well-balanced daylight.

Durability. Less exposure to direct sunlight means furnishings and artwork last longer.

Value. Costs for heating, cooling and electric lighting will be lower. It may be possible to eliminate the cost of an air conditioner altogether.



These photos illustrate what can happen when too little thought is given to the sun. In the top photo, the large amount of unshaded, west-facing glass is a source of glare year-round and overheats the house, particularly during the summer. The wall of windows in the bottom photo is attractive, yet lets in so much light and heat that homeowners keep it covered most of the day.

Sensible Solar

There are several ways to put the sun to work in your new home. These are the most promising:

- **Daylighting.** Light from the sky can easily meet most daytime lighting needs. Window placement, sizing and shading are important design elements—none of which have to add cost. See [Lighting](#).
- **Passive solar heating.** Sunshine is collected through south-facing windows, stored in the mass of the home and slowly released to meet winter heating needs. A low-cost “sun-tempering” approach—moving more window area to the south wall—can offset daytime heating needs on sunny winter days.
- **Solar water heating.** The sun warms solar collectors located outdoors, typically on the roof. A fluid transfers the heat to a storage tank inside the home where it meets part or all of your water heating needs. This is a moderate-cost solar option.
- **Solar electricity.** Solar-electric panels directly convert sunlight to electricity. Some systems use batteries to store excess power until later needed. “Grid-connected” systems use the electric utility system to balance supply and demand. Costs for solar electricity have been decreasing, but this remains an expensive option.



A carefully designed passive solar home lets in an appropriate amount of winter heat, stays cool in the summer and provides balanced daylight year-round. Design oversights can lead to too much heat, large temperature swings or glare.

Daylighting and low-cost passive solar approaches make sense throughout Colorado. Solar water-heating and electric systems can be the lower-cost alternative in areas where the costs to extend utility lines are prohibitive. In urban areas, conventional approaches almost always are less expensive, yet people elect to install solar systems based on concerns such as the environment and finite fossil fuel supplies. It also makes sense to plan ahead when your new home is built so you have easy options to make more use of the sun in the future.



Solar water heating or electric systems are other ways to use the sun's energy. Even if costs are out of your reach at time of construction, south-facing roof area and “rough-ins” for plumbing or electrical wiring make it more feasible to add a solar system in the future.

What's Important

- Look for homes with north and south exposures to make solar applications more successful and to avoid too much sun.
- Unless you are buying a carefully designed solar home or live in a cool mountain location, solar control windows will be a smart choice. See [Windows](#).
- Be aware that many types of trees will take years to grow large enough to provide much shading. Fast-growing vines can be an effective short-term solution.
- Details matter when you're trying to design an effective solar system. Hire an experienced solar professional to avoid common pitfalls.
- Check to see whether the solar exposure of your home was taken into account when its cooling system was sized. See [Forced-Air Heating and Cooling](#).

House as a System

A house is more than just a collection of parts. It is a **system** that incorporates heating, cooling, air circulation, lighting and more. If the pieces don't work well together, there will be problems. In a high-performing home, a “whole-house” design approach and quality craftsmanship combine to deliver better comfort, healthier indoor air and energy cost savings in a package that's built to last and hold its value.

More Information

This fact sheet is one in a series. Visit the following Web site for more information about solar smart design or to review fact sheets on other new home choices: www.ColoradoNewHomeChoices.org.

