Passive Solar Design


Photo: Pamm McFadden, NREL 02904

To get the most from your home - think sun. That's right, the sun can heat and cool your home and reduce its energy use. More importantly, the energy from the sun can make your home comfortable year round.

There are two types of solar design systems -passive and active.

Homes constructed as passive solar design use the natural movement of heat and air to maintain comfortable temperatures, operating with little or no mechanical assistance. It's called passive solar because the design of the home maximizes the benefits it receives from the sun with standard construction features. Passive solar takes advantage of local breezes and landscape features such as shade trees and windbreaks, and uses a simple system to collect and store solar energy with no switches or controls.

On the other hand, active solar systems use mechanical devices such as pumps and fans to move heat from collectors to storage or from storage to use. Photovoltaic panels that collect solar energy, turning it into electricity, are also considered an active solar system.

Although, building a passively designed solar home takes careful planning, the task is relatively simple - if you use the five basic solar design principles:

- Orientation
- Overhangs and shading
- Windows
- Thermal Mass

Actually, the first four principles shouldn't be reserved for only the passive solar home - they work well with any home, custom-built or tract. Passive design features, such as shading or insulation, can be used to improve your home without major renovation. Windows and thermal mass, however, are best done during new construction or major remodeling.

And speaking of thermal mass, passive designed homes also include this unique feature, not found in conventional homes. Thermal mass is any construction material that allows a passive-designed homes to collect, store and distribute the sun's energy. It will be discussed in detail later. For now, remember that it's what makes a solar designed home, truly a solar home.

Passive systems can be built with different configurations of energy-saving features and a variety of conventional and unique architectural styles. Rather than being totally different, a carefully designed and constructed solar home is more of a "rearrangement" of the same construction materials needed to build any home. Most new homes in California, for example, are constructed on a concrete slab - one of the basic design elements of a passive solar house.

Building to take advantage of solar energy need not cost any more than building a comparably sized non-solar conventional home. A home that is properly oriented, tightly constructed, well insulated, and has operable windows for air circulation is both comfortable for the occupants and easy on the wallet. You can call it passive design or just smart construction.

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