

# Passive doesn't mean lazy

## Use solar energy without a photovoltaic panels

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*Living Green*



My wife is a very industrious person. Weekend or weekday, daylight to dark, she knocks out projects item by item using carefully thought out “to do” lists.

I, on the other hand, though not necessarily a lazy person, tend to relax some when my key chores are completed. I like to have the rest of my day just go with the flow – passively.

That is probably why the idea of using passive solar energy appeals to me. Passive solar concepts provide benefit with little or no effort over the long term and only require a little planning and calculation up front.

So how do we use solar energy in our home without installing photovoltaic electric generating panels or active solar water heating?

**Solar orientation** – uses windows placed in a home to maximize solar heat gain in the winter and to minimize heat gain in the summer (also known as aperture control). South facing windows that are installed with

**For the LEED-H Platinum Home owned by Don Rudisil and built by Sun & Earth Builders, passive solar design was used including south-facing windows with overhangs engineered to minimize summer heat build-up and maximize desired winter heat gain when sun angles are low.**



overhanging shade take advantage of the sun's low-winter angle to let radiant energy warm the home in winter.

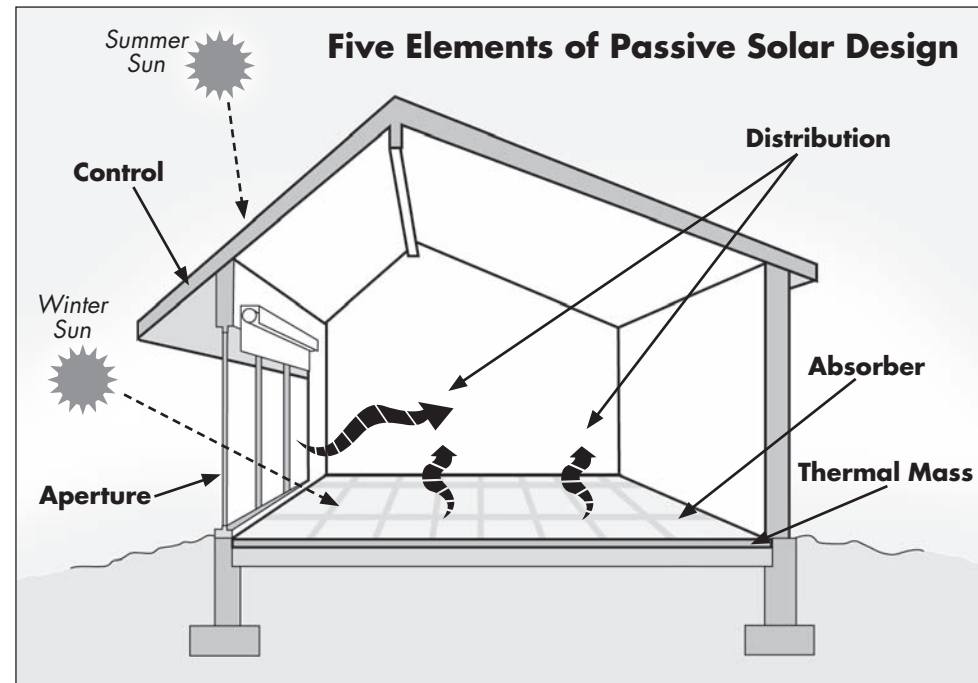
As days get longer and the sun climbs higher in summer, window glass and interiors are shaded, limiting the need for expensive air conditioning. East and west facing windows should be kept to a minimum or carefully shaded to reduce heat gain during the hottest summer months.

**Thermal mass** – Thick, solid walls and floors slowly absorb and then release radiant energy after direct exposure to sunlight. Cultures living in high and dry places, such as southern New Mexico, have enjoyed the benefit of massive stone or adobe walls for centuries. Modern adobe, rammed earth, stone and concrete or solid concrete block home

construction provide the same passive solar benefits discovered and used by our ancestors. The best benefit from these materials is gained when combined with thoughtful orientation and shading.

Similar to the window strategy, south facing walls shaded in summer stay cool. In winter, the massive walls receive warming sunlight all day and slowly release the stored heat passively to heat the interior. Thickened

“ Take time to plan for passive solar design elements in your home. ”



This graphic from the U.S. Department of Energy shows that there are five elements needed in passive solar design.

floors or interior massive walls situated to soak up winter sun provide the same benefit.

**Distribution** – These are the methods by which passively collected solar heat circulates from the collection and storage points to different areas of the house. A strictly passive design will use three natural heat transfer modes – conduction, convection and radiation – exclusively. In some applications, however, fans, ducts and blowers may help with the distribution of heat through the house.

Heated air tends to rise and cool air sinks. This is obvious in two story homes where the first floor is more comfortable in summer, and upstairs is the place to be in winter. Passive convection systems are designed to encourage airflow and heat distribution in a home based on naturally occurring convection.

Night sky cooling strategies releases warm air out through vents high in the home envelope overnight and bring in cool air close to the ground. Trombe walls, windows that face massive wall assemblies with only a small air space in between, trap and heat air that can be moved by convection or powered fans to

interior living spaces or even to stone or water filled basins to be released in to the home as ambient temperatures decrease. Air space gaps under shed roof deck assemblies can be vented and opened to living spaces in winter to move solar heated air and warmth inside.

These principles of passive solar building design can be incorporated in to pretty much any style of home. Every strategy does not have to be included to get benefits, but we can start at the design process to ensure passive solar design elements are not ignored. Some building sites, and lots will be easier than others for passive solar design integration, but at least a few of these basic elements can be implemented in nearly any home.

It's OK to be passive – just don't be lazy. Take time to plan for passive solar design elements in your home.

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