

# Keys to Successful Solar Design

For Homeowners

Now, as your new house is being planned, is the time to seriously consider solar energy. If you wait until after the house is built, it will likely be too late.

Not all homeowners choose to install solar energy systems during construction. Even so, every home should be designed and built so that it will easily accept a solar energy system later. This approach is called "solar ready." At a minimum, new homes should address several key issues:

**Site selection.** Choose a building site that lends itself well to solar gain—for example, good southern exposure and no substantial shading from mountains, trees, or buildings.

**Orientation.** Orient the house to provide maximum southern exposure for rooms and windows. Although due south is best, a deviation of 30 degrees or less from true south is considered acceptable for most applications.

**Solar Access.** Ensure that the solar collector area, roof, and window surfaces are unshaded from 9 a.m. until 3 p.m. to maximize solar gain.

**Plumbing.** For solar water-heating systems, provide a pipe chase from the solar collector area to the hot water storage area.

**Electrical.** For solar electric systems, provide a wire chase to connect the solar array, the inverter, and the electrical circuit panel. Also provide a circuit in the breaker box for the solar electric feed.

Montana Solar ENERGY STAR Homes is administered by:



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How to  
**BUILD A BETTER HOME IN MONTANA**  
with solar energy and energy efficiency

## ENERGY STAR Solar Homes

- BUILDING ORIENTATION
- SOLAR ELECTRIC SYSTEMS
- PASSIVE SOLAR DESIGN
- SOLAR WATER HEATING
- COMFORT
- DURABILITY
- PERFORMANCE TESTING
- CERTIFIED ENERGY EFFICIENCY



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TO THE FUTURE!**

National Center for Appropriate Technology

**ENERGY STAR Homes Northwest** (ESHNW) promotes the construction of new homes built to an energy efficiency specification negotiated specifically for Idaho, Montana, Oregon, and Washington.

Natural gas-heated homes built to this voluntary construction standard reduce electricity use by about 20 percent and natural gas use by almost 40 percent compared to the state energy code. Homes with electric heat built to the ESHNW standard will save about 60 percent of electric use.

Homes achieving ENERGY STAR certification are independently verified, so you can rest assured knowing that your new home will perform efficiently far into the future!

To learn more, visit these websites:  
[www.northwestenergystar.com](http://www.northwestenergystar.com)  
[www.energystar.gov](http://www.energystar.gov)

But don't stop at energy efficiency. The best new home designs also include solar energy—capturing the sun's energy to heat living spaces and domestic water, provide electricity, and provide natural lighting.



Using the sun to provide some of your new home's energy needs makes both economic and environmental sense. There are several options for using solar energy systems in your new home.

**Solar tempered designs** are the simplest and least expensive solar design strategies because they do not require thermal mass. Instead, the house is oriented and shaped in response to the sun. South-facing windows capture the sun's energy, providing as much as 20 percent of a home's space heating energy needs.

**Passive solar designs** can provide over half the space heating energy, but require added thermal mass—such as concrete, tile, or brick—that can also add significantly to the cost of the house.

**Solar electric systems**—also called **photovoltaic** or **PV**—generate electricity directly from the sun. A **grid-connected**, or net-metered PV system is connected to the utility grid through a special meter that turns backwards when the house produces more electricity than it needs. The utility grid serves as storage, eliminating the need for batteries. Off-grid systems also are available, but they require batteries for energy storage.

For NorthWestern Energy electric customers, net metering allows solar electricity generated during sunny times of the year to offset electric use at other times. Other utilities have net metering policies that limit this ability to "bank" solar energy generated to a monthly or quarterly basis.

**Solar water-heating systems** can reduce the cost to heat domestic water by as much as half. The challenge in northern climates such as Montana is freeze protection, but there are a number of systems on the market that provide freeze protection.

