SERVICE IN ACTION

COLORADO STATE UNIVERSITY EXTENSION SERVICE

Locating the solar window

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Quick Facts

- When planning to utilize solar energy in any manner, the first step is to locate the solar window.
- The solar window is defined by the daily and annual movement of the sun.
- The division of the solar window into two parts — the lower part when solar energy is desired and the upper part when solar energy is to be blocked — will vary according to local climatic conditions.
- Determining the solar window for a site will help in placement of active collectors or passive apertures, orienting rooms to the sun, placement of landscape materials and location of shading devices.

When planning to utilize solar energy in any manner — active or passive heating systems, landscaping for energy conservation, or orienting a house properly — a first step is to locate the "solar window." If the sky is envisioned as a dome with its center at the house, the solar window is that part of the dome that admits solar energy useful to a south-facing solar collector.

The solar window is defined by the daily and annual movement of the sun. The track of the sun on June 21 and December 20 marks the upper and lower boundaries of the solar window. The sun's position at 9 a.m. and 3 p.m. (standard time) marks the east and west boundaries of the solar window (see Figure 1). Another useful way to view the solar window is to think of the southern sky as a flat surface across which the sun moves. In this case, the solar window would appear as in Figure 2. This is the view of the solar window a person would see when looking south from a house site.

The sun's path on the equinox dates (March 21 and September 21) divides the solar window into two halves (see Figure 2). When the sun is in the lower half of the solar window (September 21 to March 21) there must be no obstructions to solar energy striking the house or collector. (Solar energy is beneficial for heating at this time of the year.) When the sun is in the upper half of the solar window (March 21 to September 21) shading is desirable to prevent unwanted solar gain during the warm season. (The exception would be the case of a solar domestic water heating system that requires solar energy throughout the year.)

The division of the solar window into two parts — the lower part when solar energy is desired and the upper part when solar energy is to be blocked — will vary according to local climatic conditions. The equinox dates provide a convenient first approximation of the dividing point.

A plan view of the solar window (Figure 3) provides another useful consideration in utilizing solar energy efficiently. Note that during the winter months, only the south side of the house receives significant solar energy through the solar window. However, during the summer months, the east and west sides (in addition to the south side) receive large amounts of unwanted solar energy through the solar window. Thus, solar collecting devices must be located only on the south side of the house. The east and west sides of the house must be shaded and window area minimized to prevent unwanted solar gain.

Determining the Solar Window for a Site

Proper determination of the solar window for a house or other site is a useful first step in developing or assessing proper solar design. Determining the solar window will aid in 1) placement of active collectors or passive apertures, 2) floor plan layout to orient rooms to the sun, 3) placement of landscape materials, and 4) location and size of roof overhangs and other architectural shading devices.

Figure 4 gives the angle of the sun (with the horizontal) at noon for the upper, lower and dividing points on the solar window at 39 °N latitude (Colorado lies between 37 ° and 41 °N latitude). This information would be helpful to home buyers in analyzing a house to determine access to the solar window.

The best way for homeowners to determine the solar window for their house is to make observations between 9 a.m. and 3 p.m. (standard time) at various times of the year. Plan any building, remodeling or landscaping to complement the solar window.

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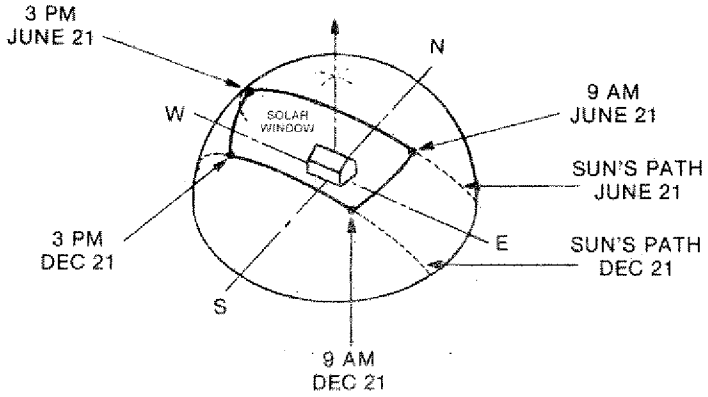

Figure 1: The solar window.

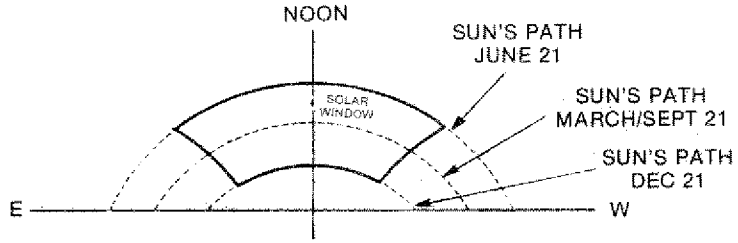

Figure 2: South-facing view of the solar window.

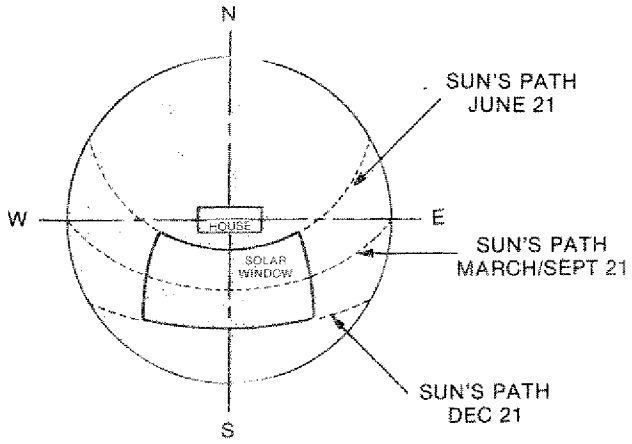

Figure 3: Plan view of the solar window.

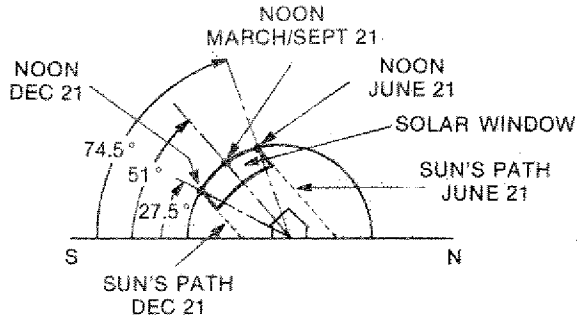

Figure 4: Cross-section of the solar window showing the angle of the sun at noon for 39 °N latitude.