Solar Space Heating Tax Credit

Heating a home with solar energy is not difficult in Oregon. If done correctly the home will use 20 to 50 percent less energy during the heating season, have good day lighting and remain cool during the hottest summer months. Two approaches can be used to heat a home with solar energy: an active system or a passive system. Active systems use mechanical equipment such as a pump or fan to move energy from collectors into the house. Passive systems are much more common, simply relying on south facing windows to allow solar heat and light into the home.

To qualify for an **active** solar space heating tax credit the system must be capable of reducing space heating needs by at least 15 percent. Consult with your solar technician to determine the energy savings generated by an active system design. Oregon Department of Energy staff will verify these savings are reasonable.

To qualify for a **passive** solar tax credit the passive solar features must be capable of reducing space heating needs by at least 20 percent and not increase the need for cooling. Passive solar savings are harder to estimate, but meeting the following guidelines will ensure your home's eligibility. The term "Solar windows" refers only to those windows that face within 30 degrees of *true* south, have a Solar Heat Gain Coefficient (SHGC) not less than 0.60, and are located in a room that has some form of thermal storage (brick, stone, water, etc.) that is not mechanically or electrically heated (e.g. radiant floor).

Passive Solar Guidelines

1. The building layout maximizes passive solar gain, and good daylighting.
2. At least half the windows are solar windows (for new construction).
3. There is sufficient solar window area. West of the Cascades this is equal to 9 percent of the total floor area, and East of the Cascade this is equal to 8 percent of the total floor area.
4. South windows have a SHGC not less than 0.60.
5. The area-weighted average window heat loss rate (U-factor) is not greater than 0.35.
6. There is adequate thermal storage to prevent overheating. For each square foot of solar window there should be about 13 square feet of hardwood or 3 three square feet of unheated stone/concrete.
7. Window overhangs are sufficient to shade most of the window during the summer but allow 100 percent solar gain the late fall.
8. The space heating sun chart shows less than 10 percent shading loss from trees or buildings.
9. North windows less are less than two percent of the total floor area.
10. Skylights are less than 1 percent of the floor area and have an SHGC of no more than 0.30.
11. West facing windows have a SHGC of 0.35 or less.
12. Passive cooling is possible with an operable window or skylight is located near the highest point.

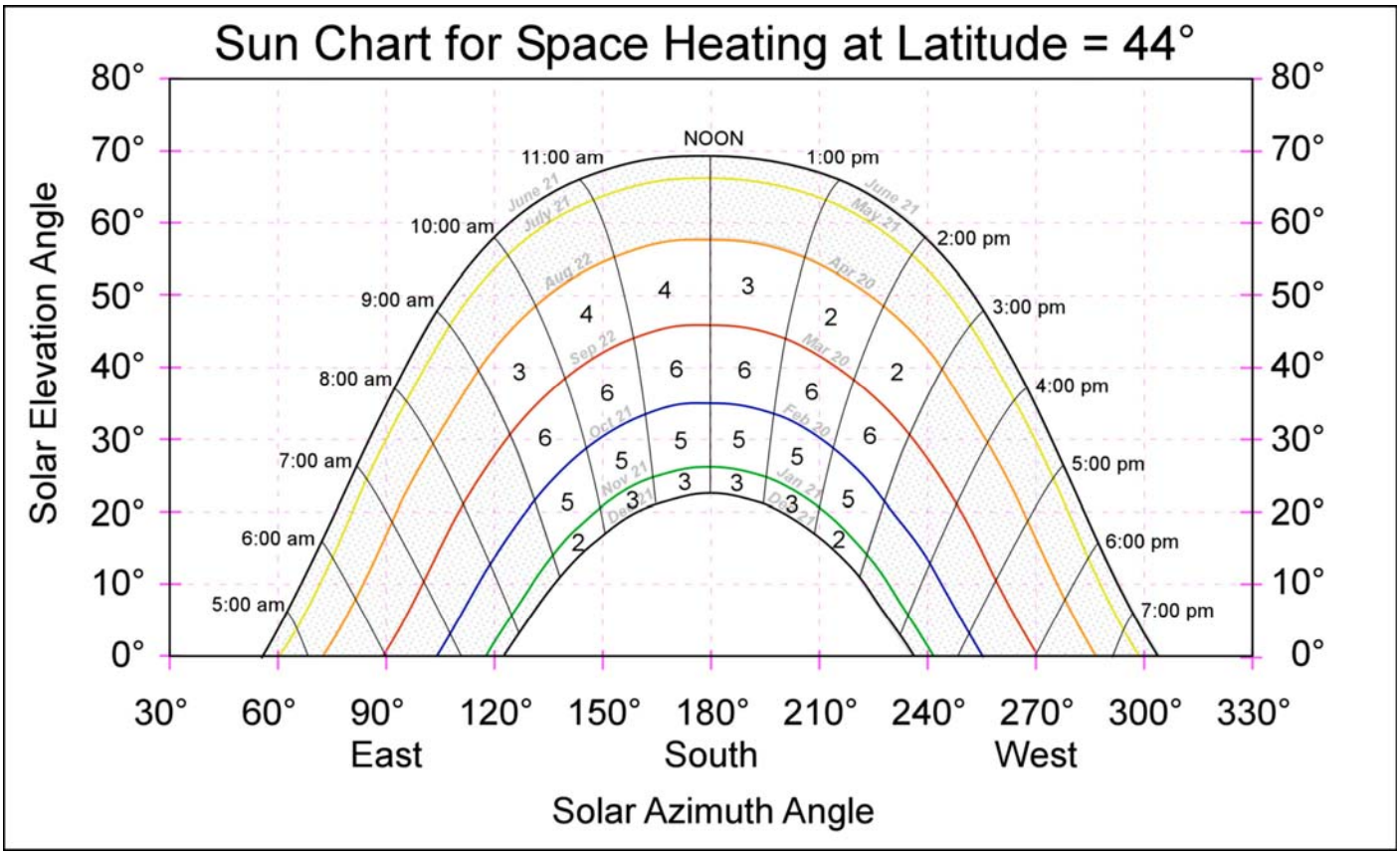
Other Notes:

- Choose solar windows wisely and keep the window "stickers" that verify their SHGC and U-values. Although, solar windows must have an SHGC value of not less than 0.60, other windows should be selected for their low U-value (0.30 or less is very good) not their SHGC value.
- Have the home tested for air tightness. A good airtight home will have less than two air changes per hour when pressurized to 50 Pascals. With a home this tight however, it is important to include an energy or heat recovery ventilator so that fresh air can be delivered into the house without a substantial energy penalty. Tax credits are available for some ventilators as well.
- Radiant heating systems generally do not work well with passive solar heating. This is because they tend to pre-heat all the storage that your passive solar energy is trying to heat. This lack of available thermal storage can result is a home that is comfortable in the morning but seriously overheated in the afternoon.

Solar Space Heating Sun Chart

Using the sun's energy to heat a home requires being able to collect energy during the time of year when heating is needed. The following sun chart lets you estimate the energy loss from external shading for space heating loads. This sun chart approximates the coincident value of both availability solar energy and the months when space heating is most needed. It is valid for collectors that are facing within 30 degrees of true South. Remember that true south is about 20 degrees east of magnetic South. The following steps will help determine what fraction of solar resource your site has for space heating.

Step 1 From the midpoint of the collection area (windows or solar collectors) draw the skyline on the graph below. Use the elevation angles and solar azimuth angles to determine the location of the obstructions. Draw deciduous trees with a dotted outline and fill with light shading. Year-round (solid) obstructions like buildings, or conifer trees should be drawn with solid outlines and filled with heavy shading.



Step 2 Add up the solar fraction numbers in the sections that have shading. You can use fractional values if the obstruction only covers a part of a section. In addition, any deciduous tree shading below the Sept 22/March 20 line can be counted at half value to account for the fact that some light will get through these obstructions when the trees lose their leaves. This sum is called the "shading fraction" and represents the fraction of energy lost to external shading for space heating systems. The actual fraction of energy that reaches the windows or solar collectors is equal to 100 percent - shading fraction.

Prime Solar Fraction = 100% - _____% = _____%
(shading fraction)

Ideally the Prime Solar Fraction should be 100 percent, however anything above about 90 percent is considered good.