

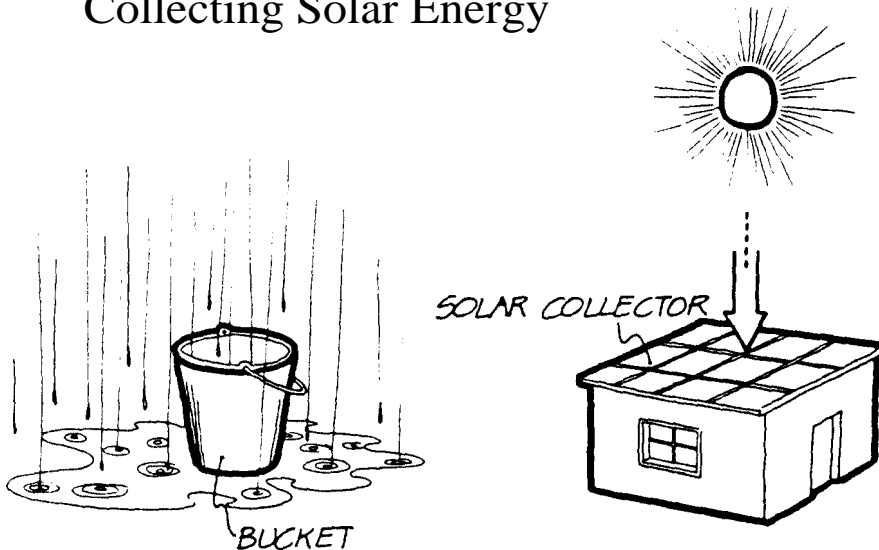
SOLAR COLLECTOR ORIENTATION

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A solar heating system has two major parts: the solar collectors and the heat storage. The collectors capture the solar radiation that strikes them. As much as possible of this heat is then stored in the heat storage, and from there it is delivered to the house.

Solar collectors can be thought of as big nets which gather the solar radiation that strikes them. Just as a bucket in a rainstorm collects rain, so a solar collector collects the solar radiation raining down on it.

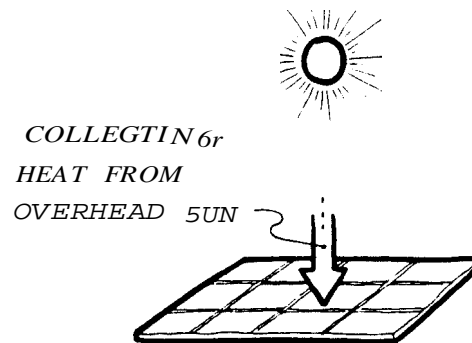
Catching Rain is like
Collecting Solar Energy



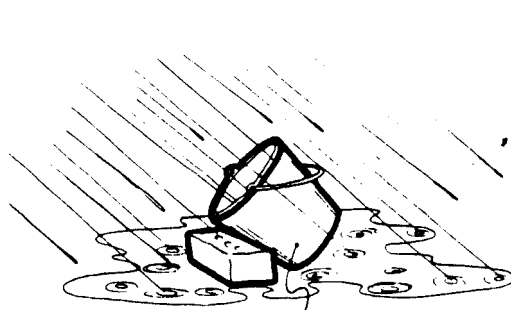
If you were trying to collect the most rain you could in a bucket, you'd hold the bucket at the proper angle to catch the rain. The open top of the bucket is the rain collector, and you'd point it toward the rain. If the rain were coming straight down you'd hold the top level, but if the rain were driven by the wind you'd tilt the bucket so that the top would still face the rain. Similarly, a solar collector should point toward the sun to pick up the most solar radiation possible. How can you tell if the sun is pointed at the collectors? If a small peg sticking straight out from the collector leaves no shadow, then the collector is pointed straight at the sun.



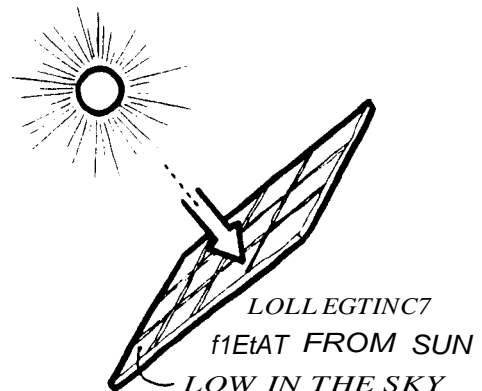
CATCHING RAIN ON A
CALM DAY

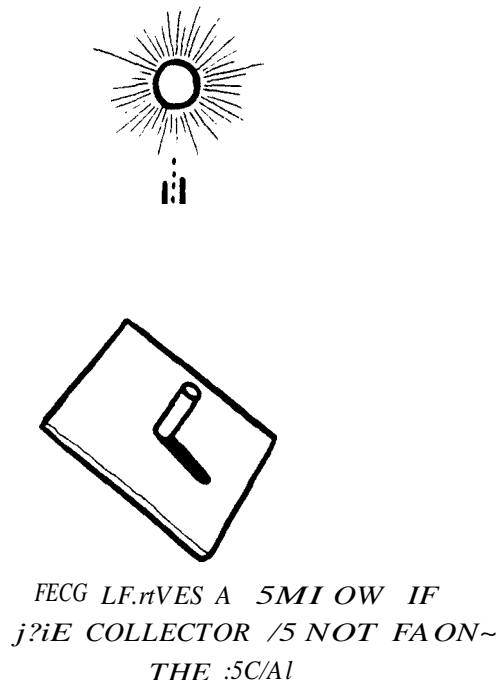
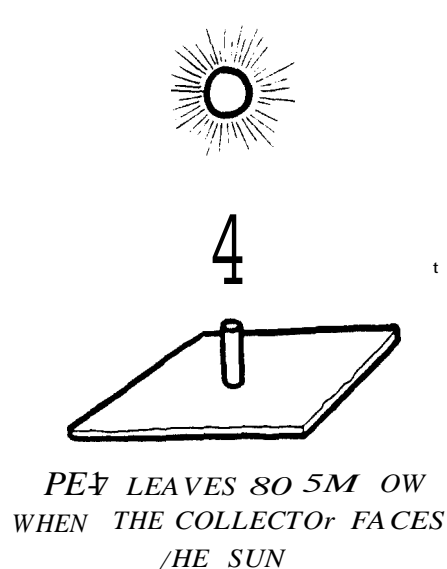


A Solar Collector Should Face the Sun



CATCHING RAIN ON A
WINDY DAY



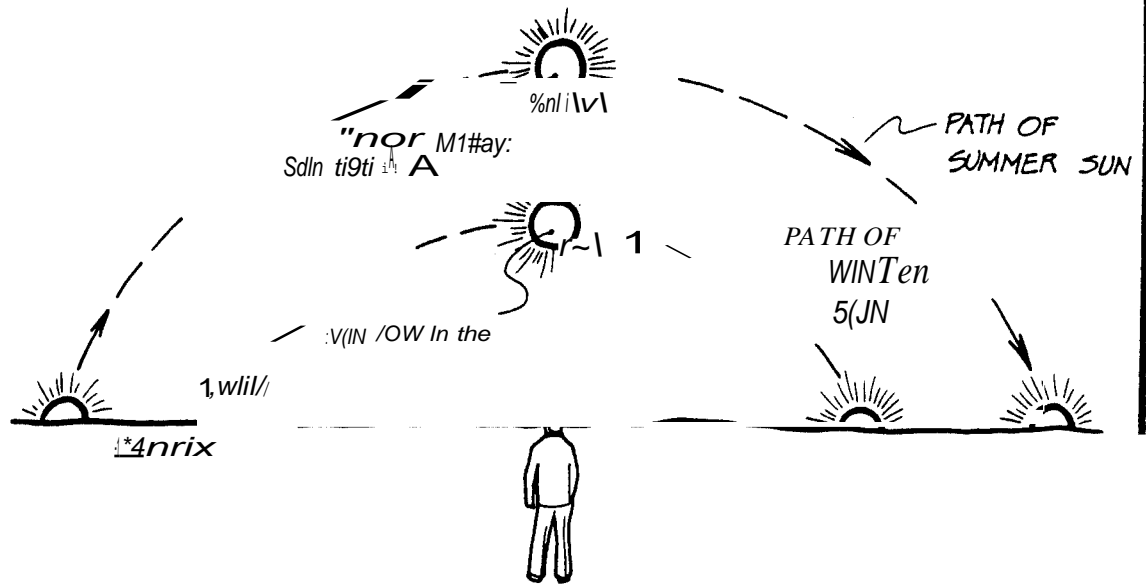


Collector Facing the Sun Leaves no Shadow

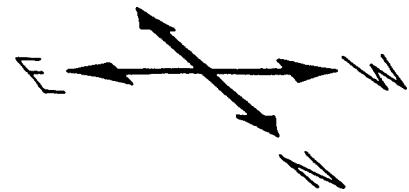
The sun's position in the sky changes during the day as the earth rotates. In the morning the sun rises in the east; in the evening it sets in the west. At midday the sun is highest in the sky, but it is never directly overhead (at least not in the United States). If you were to face directly south for a whole day the sun would rise at your left, travel in an arc through the sky, and set at your right.

The sun's position also changes with the season. In the winter, the sun is lower in the sky at midday than it is in the summer. You can get a better idea of the seasonal change of the sun's position by thinking in terms of shadows. Since the sun is higher in the sky in the summer, your noontime shadow **will be** shorter than it will be in the winter.

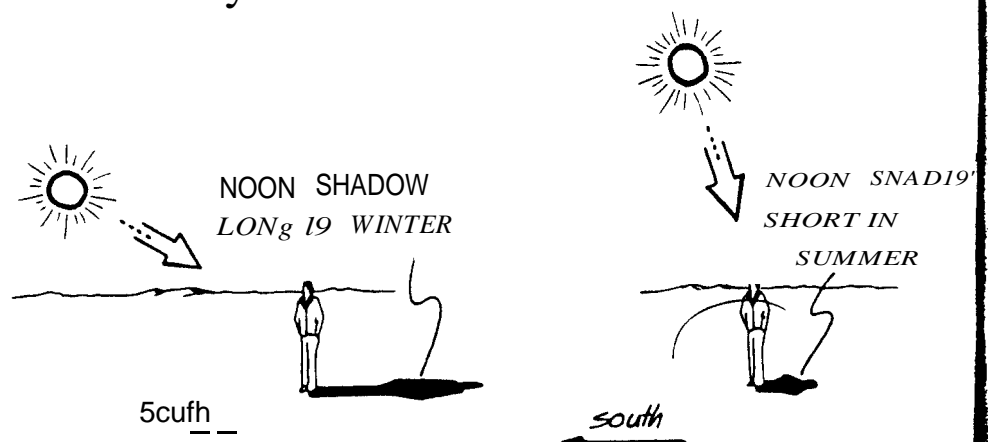
The sun's position in the sky changes from hour to hour and also with the season, yet we want to catch the most sunlight possible from a flat-plate collector that can't move so that it always faces the sun. To do this, we compromise so that the collector is pointed south, whereby it most nearly faces the sun during the midday hours, even though some solar radiation is lost in the morning and evening hours. Although there is a best direction to face a flat-plate collector, depending on the local latitude (less tilt is needed in the south than the north), a tilted collector that generally faces the south performs adequately.



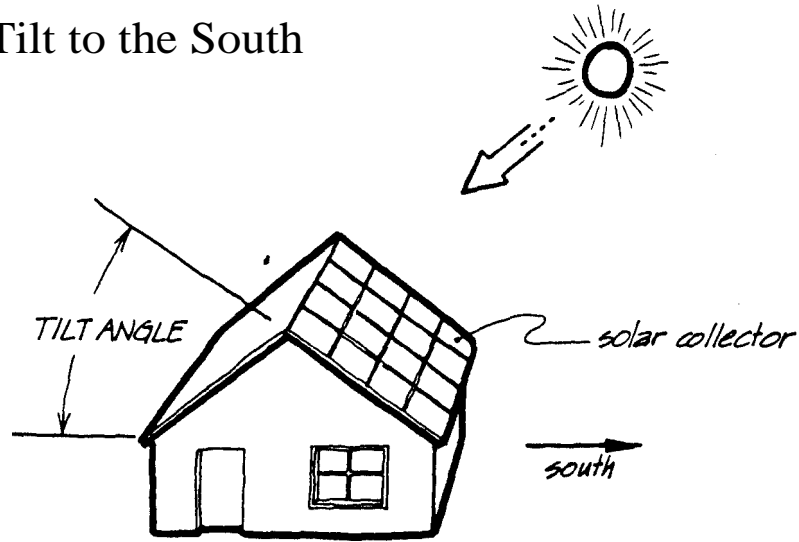
Sun's Position Changes with Season



Noon Sun is Higher in Summer Sky



Solar Collectors Should Tilt to the South



House-heating systems usually have a comparatively high tilt angle, since houses need the most solar heat in the winter when the sun is low. Hot-water systems need solar heat in both summer and winter, so they have a medium tilt angle—a compromise between facing the sun in the summer and the winter. Solar swimming-pool heaters usually have the lowest tilt angle. They need heat mostly in late spring, summer, and early fall when the sun is highest in the sky.

Tilt Angle Depends on Application

