Altitude & Azimuth

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Derivation: Altitude is from Latin altitudo, *height or depth; azimuth is from Arabic* as-samt, *the way.*

When talking about solar siting, altitude and azimuth are just fancy ways of saying height and direction. They both refer to angles, and they both describe the relationship between the sun and your site.

Altitude refers to the angle of the sun above the horizon. (It is sometimes called "declination" or "elevation.") It is specified in degrees, and varies depending on what time of day it is, what time of year it is, and where you are on earth.

When the sun is just rising or just setting, its altitude is 0 degrees. When the sun is at its highest in a given day, we call it "solar noon."

Northern latitudes get the most direct solar exposure during June, and southern latitudes get it in December, because the earth's tilt makes the sun's altitude highest in each hemisphere's summer. The opposite occurs in December in northern latitudes and June in southern latitudes, when the sun's altitude is at its lowest.

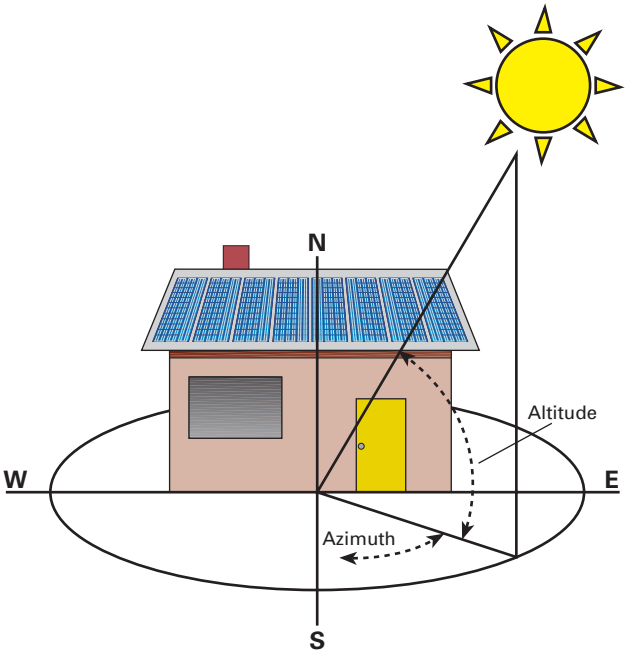
Because the earth's rotational axis is not exactly aligned with the earth's orbit around the sun, your latitude affects the altitude of the sun. In January, for instance, the sun's altitude at solar noon at the equator is about 65 degrees. At the same time, it's about 35 degrees in San Diego and about 20 degrees in Seattle.

Azimuth, when talking about solar energy in the northern hemisphere, refers to the angle between where a surface (such as a solar collector) is facing and true south. The term is also sometimes used to mean the angle between true south and where the sun is at a given moment.

The goal when you site a solar thermal collector or solar-electric module is to capture the most energy possible. The ideal is to have the collector or array perpendicular to the sun's rays. When you're at the beach trying to soak up the rays, you'd like to do the same thing.

Unless you have a mechanical mount that moves to change both altitude and azimuth, you have to make a compromise and pick the angles that will give you the most energy for the season or year. For a fixed, nonadjustable array, a good rule is to make the *altitude* angle the same as your latitude. For seasonally adjustable arrays, use latitude for the spring and fall angle, adding 15 degrees for the winter angle and subtracting 15 degrees for the summer angle.

Generally speaking, setting your fixed array or collector to true south—0 degrees *azimuth*—is going to give you the most energy. But local weather and site conditions, like if you get morning fog, or trees shade your site either early or late in the day, will affect your siting decisions. And even if you are 15 degrees off of true south, you will still get about 90 percent of the available energy.



It's not really much more complicated than what you do every time you use a solar oven. You tilt and turn the oven to where the sun casts the smallest shadow possible, so you can get the most out of your investment in solar energy equipment.

Access

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