Do Solar Panels Work During the Winter?

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As the days get shorter and the temperature starts to drop, you may be wondering if solar panels still work during the winter. The good news is that solar energy works just as well in the cold weather as it does in the summer! Keep reading to learn more about how solar energy works during the winter.

In the continental United States, solar panels positioned ideally to receive optimum sunlight generate about 53% less electricity for the winter months than for the summer. Why? We've already established that cold weather *helps* solar panel winter efficiency.

Solar Panel Output In Cold Vs. Hot Months

Electrons are relatively at rest at colder temperatures, so when the electrons become stimulated by exposure to sunlight, a bigger difference in voltage occurs from a solar panel, which generates a larger amount of energy. That is why a solar cell produces electricity most efficiently in cold conditions and is less productive in heat.

With each degree the temperature rises above 25 Celsius, solar cells lose about 5 percent of their power to produce energy. Any temperature lower than that allows good productivity from solar panels.

So, solar panels are most efficient in cold temperatures on windy days with bright sunlight. That provides an abundance of sunshine to convert into electricity. That's because it is not the *heat* of the sun that generates electricity from solar panels; it's the conversion process inside the silicon crystal of the solar cells' structures.

Additionally, snow cover on the ground and roof actually helps keep solar panels cool in winter, and it reflects much more light than uncovered soil, grass, and dark roof material. So conditions are optimized even more for solar panel efficiency with a blanket of snow on a sunny winter day. Solar panels are tilted, so sunshine on a winter day can melt snow enough to cause it to slide off of panel surfaces.

This means that, for example, a solar energy system can easily generate more electricity on a sunny winter day in Minnesota than on a sunny summer day in Arizona. So, again, why are solar panels generally less efficient as energy producers in winter than in summer?

Why Does Solar Panel Productivity Drop in Winter?

Even though solar panels are more efficient in cold temperatures than in hot, they still produce much more energy in summer than in winter. That may seem like a riddle. But, there are two quite simple reasons why solar panels work better in cold than hot weather and yet are more than 40 percent *less* productive in winter months than in summer:

Solar panels do not produce efficiently when covered with snow

We've explained above that solar panels can receive more light when they're surrounded by snow on the roof and/or the ground around them. But, a solar energy system cannot work well when the *panels* themselves are covered in snow. That's because the snow blocks sunlight from reaching the surfaces of the solar crystals of the panels.

Most solar panels are mounted at an angle, so snow can melt and slide off the panels onto the ground. But, when panels do not absorb *enough* heat to melt the snow off and the snow is not manually cleaned off, sunlight cannot reach the surface of the panels in sufficient amounts to produce energy as well as it can on days when there is no snow on the panels.

Solar panels do not produce as much on dark or overcast days

Direct sunlight on the solar panel surface is the principal factor in solar panel output rates. The length of days in the summer months is longer. Therefore, the collective total number of hours of sunlight for the summer season is much higher than the total sunlight hours for the winter season.

Days are shorter in winter. There is also a much greater depth of cloud cover in winter than in summer, with more frequent precipitation, and a much heavier form of precipitation, snow. All these elements adversely impact solar panel efficiency.

For example, on *dark*, densely cloud-covered days, solar panels may generate only about 10% of the full amount of production for which they're rated. Light diffusion is the loss of energy from photons as they hit against the water molecules as they try to pass through

clouds. By contrast, light diffusion is much less on *bright* cloudy days, and the panels may produce 30 to 40 percent of their full rating.

Conclusion

The above information explains why solar energy production is *decreased* in some southern states by the effects of very high temperatures and *increased* by the cold temperatures in northern states. That explains why solar energy production data shows northern states with high percentages of bright winter days produce great quantities of photovoltaic energy.

So, it's no longer surprising that some of these states are among the leaders in solar panel installation. In fact, the differential in installations rates between southern and northern regions is not as much as expected.

Still, due to the nature of winter, with more dense forms of frequent precipitation and fewer sunny days, it makes sense that total solar energy production is much less in winter than in summer.

For a proper perspective, solar energy production in winter and throughout the year must be evaluated as an overall annual yield. In the final analysis, the value of solar energy systems is the amount of green energy they can produce over the full period of a year, not what they generate in any single month or season.

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