



SunTalk # 5: From the New Mexico Solar Energy Association

Feeling Sunshine

How do you know when you're standing in the sun? Which of your five senses tell you what you need to know? You can't smell, or taste or hear sunshine; but you can see it, of course, and you can most certainly feel it.

In many ways, feeling sunshine is much more complicated than seeing it. Our sense of touch lets us detect mechanical pressure & vibration, **heat** or **thermal energy**, and pain. Even when sunlight is landing right on top of us, we can't feel any pressure or vibration or pain. But we can certainly feel heat. So we must be feeling thermal or heat energy coming directly from the sun. But we're not!

Light and heat are two entirely different **forms of energy**, with very different properties. Light travels - - well - - at the speed of light, while heat moves very slowly. Light can travel through a perfect vacuum, whereas heat can only sit and wait. When heat moves through cold air, it cools off fast, but light doesn't. It turns out that sunlight can't cool off because it's not hot to begin with!

The sun is so hot that it glows – just like an old fashioned **incandescent** light bulb. If both **solar radiant energy** and **solar thermal energy** are landing on us, how did they manage to travel 93 million miles from the sun to the earth thru the cold vacuum of outer space? Light has no problem at all cruising that far through the cold vacuum of outer space – it takes about 9 minutes. Heat, on the other hand, never makes it at all.

So why do we feel hot when we stand in the sun? Because radiant energy in the form of sunlight is being stopped or soaked up or "**absorbed**" by our skin. And when sunlight is absorbed, its radiant energy is **transformed** into an entirely different form of energy that we call **heat**.

When sunlight hits a shiny mirror or a pure white surface it bounces off – or **reflects** – and goes somewhere else. It doesn't get absorbed, so it doesn't get transformed into heat. This property of sunlight has been understood for thousands of years. Traditional Greek homes on warm sunny Mediterranean isles are whitewashed so that they'll stay much cooler. Traditional Arabs wear pure white flowing robes and head coverings for the same reason. It's said that Archimedes arranged thousands of shiny Athenian shields so that they reflected sunlight onto the sails of the Roman Fleet, setting them on fire. Did they all understand something that you've forgotten? But now you know something about the color of the sails on that Roman fleet. They weren't white!

When sunshine hits water or land or trees, some of its radiant energy reflects or bounces off. If that weren't the case, we wouldn't be able to see those things at all. But much of the radiant energy is absorbed, and most of that energy is transformed into heat. That's a very good thing, because the warm sea & land retain much of that heat all night long.

Our atmosphere also plays a critical role in keeping us warm. Sunlight has no problem traveling through the earth's atmosphere, but heat, on the other hand, has a much more difficult time escaping back into cold outer space. This is called the **Greenhouse Effect**, and it's responsible for making the earth a pretty comfortable feeling place, especially compared to the moon, which has no atmosphere at all. NASA says the lunar surface temperature at the Apollo landing sites varies from 180 F in the sun to -180 F in the shade. You could certainly feel that!

Some of the radiant energy in sunlight reflects off plant leaves, and some is absorbed and transformed into heat, but the rest is absorbed and used to power the process of **photosynthesis**. Likewise, some of the radiant energy in sunlight reflects off your skin, some is absorbed and transformed into heat, and some is absorbed and used to power important biological processes such as manufacturing vitamin D.

So the next time you feel like sitting in the sun for a while – soak it up! You and sunshine are muy simpático. Are ya feeling it yet?

This sun-talk came to you from the New Mexico Solar Energy Association.

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