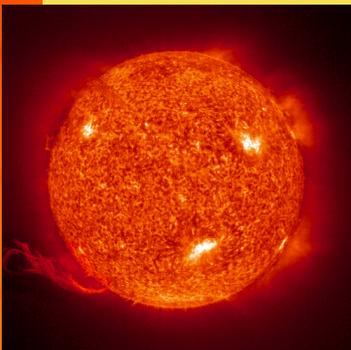


What is Solar Energy?

Solar energy is radiant energy from the sun. It is vital to us because it provides the world—directly or indirectly—with almost all of its energy. In addition to providing the energy that sustains the world, solar energy is stored in fossil fuels and biomass, and is responsible for powering the water cycle and producing wind.



Every day the sun radiates, or sends out, an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time! Solar energy comes from within the sun itself. Like other stars, the sun is a big ball of gases—mostly hydrogen and helium. The hydrogen atoms in the sun's core combine to form helium and radiant energy in a process called nuclear fusion.

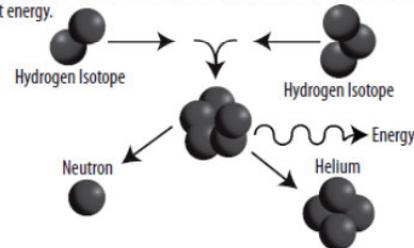


During nuclear fusion, the sun's extremely high pressure and temperature cause nuclei to separate from their electrons. At this extremely energized state, the nuclei are able to fuse, or combine.

Hydrogen nuclei fuse to become one helium atom of a higher atomic number and greater mass, and one neutron remains free. This new helium atom, however, contains less mass than the combined masses of the hydrogen isotopes that fused. This transmutation (changing one element to another) of matter results in some mass being lost.

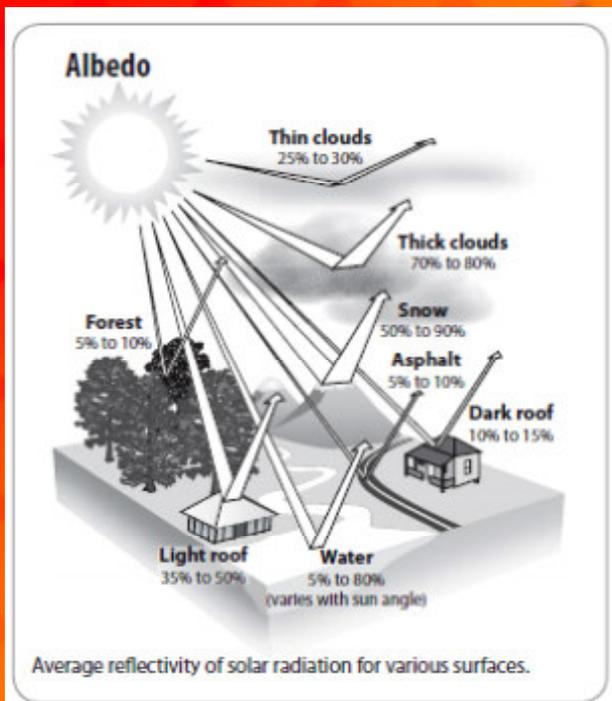
Fusion

The process of fusion most commonly involves hydrogen isotopes combining to form a helium atom with a transformation of matter. This matter is emitted as radiant energy.

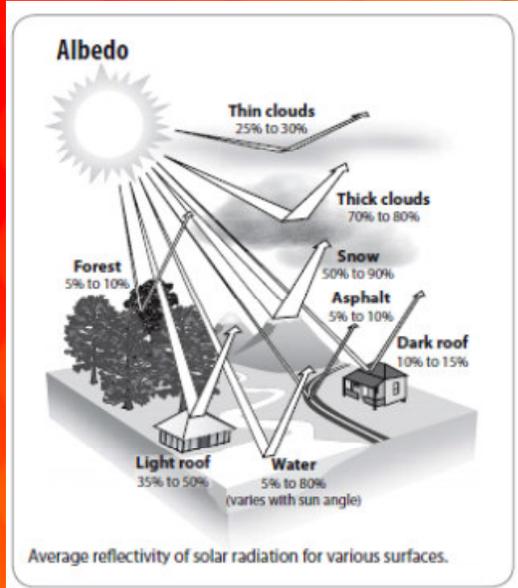




The lost matter is emitted into space as radiant energy. The process of fusion occurs most commonly with lighter elements like hydrogen, but can also occur with heavier nuclei, until iron (Fe) is formed. Because iron is the lowest energy nucleus, it will neither fuse with other elements, nor can it be fissioned (split) into smaller nuclei.



Scientists theorize that the time for the energy in the sun's core to make its way to the solar surface varies from 10,000 years to 150,000 years. The nuclear fusion process in the sun's core produces, among other things, gamma rays. These gamma rays are constantly absorbed and re-emitted as they move through the sun, essentially bouncing in random directions.

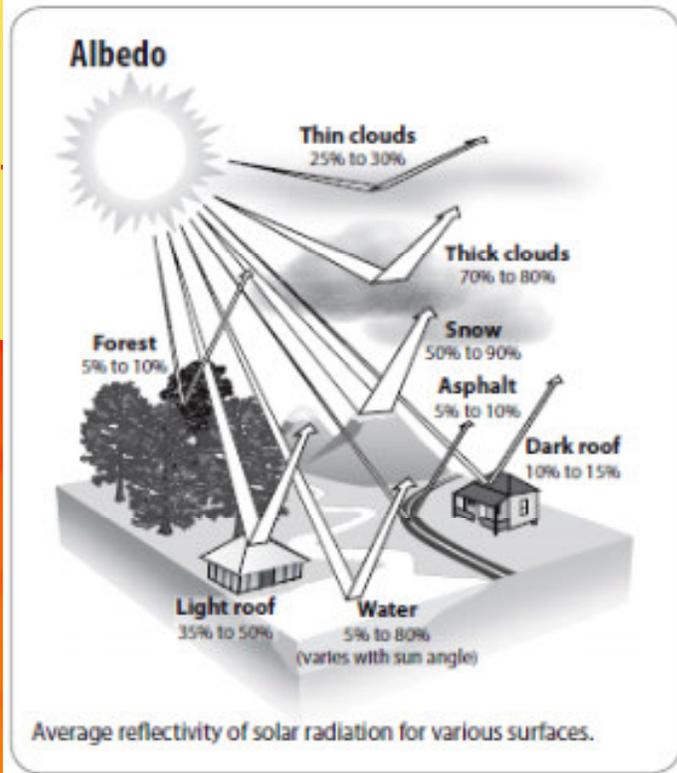


By the time this “random walk” takes them to the sun’s surface they have been transformed into visible light. This light escapes from the photosphere, the visible surface of the sun, and arrives at Earth about eight minutes later. The solar energy travels to the Earth at a speed of 3.0×10^8 meters per second (186,000 miles per second), the speed of light. Heat energy is not transmitted from the sun because the space between the sun and Earth is mostly a vacuum. Rather, radiant energy transforms into thermal (heat) energy when it strikes the molecules in the atmosphere or on the surface of the Earth.

Only a small portion of the energy radiated by the sun into space strikes the Earth—one part in two billion. Yet, this amount of energy is enormous. Every day enough energy strikes the United States to supply the nation’s energy needs for one and a half years!

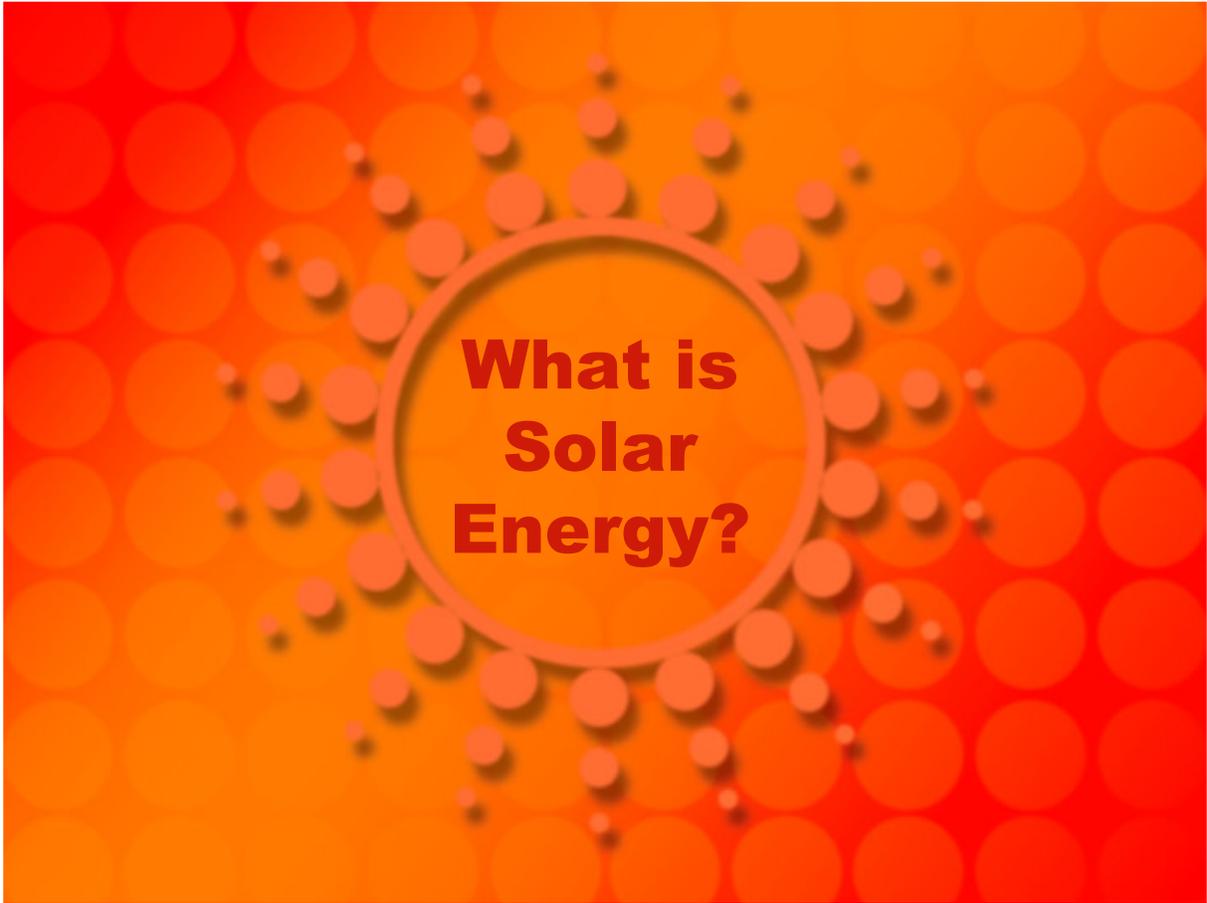


Where does all this energy go?



sun's energy into space. Another 25% is reflected into space by clouds, water vapor, and snow. Plants, the land, and the ocean absorb solar energy. The rest is used to meet our energy needs.

Solar energy is considered a renewable energy source. Renewable sources of energy are resources that are continually renewed by nature, and hence will never run out. Solar power is considered renewable because the nuclear (fusion) reactions that power the sun are expected to keep generating sunlight for many billions of years.



**What is
Solar
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