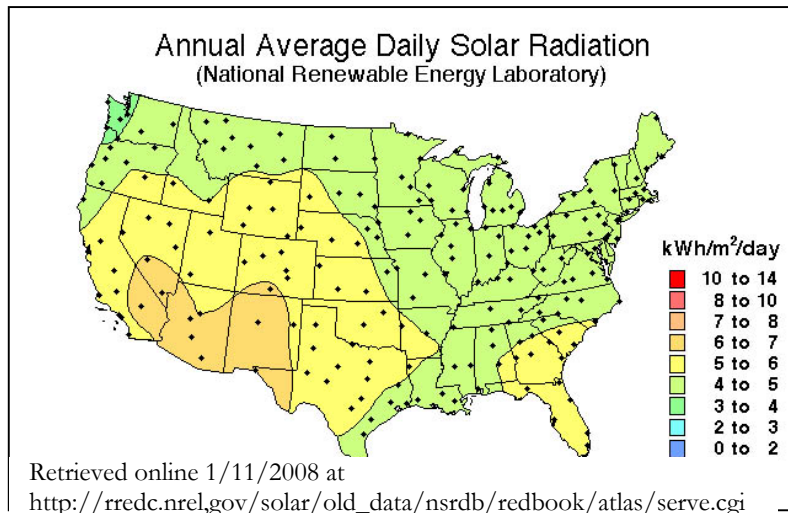


Some Basics of Solar Power

Solar energy is the elephant in the room. The solar energy striking the earth in an hour is more than the total energy used on earth in a year, by all people for all purposes. It totals 89.2 trillion TOE per year.ⁱ Of course, sunlight does not fall everywhere equally. Solar energy falls only during the day; more falls at the equator than at the poles; more falls in summer than in winter; and more falls in arid land with clear sunny skies, than in cloudy areas. The map at right shows that the highest level of solar energy in the U.S. occurs in the Desert Southwest. A square of land in the Desert Southwest 100-120 miles on each side could provide enough power for the entire U.S. using existing technology.ⁱⁱ But solar energy is a harvestable resource most of the year across most of the country. Many solar energy schemes are modular, and are thus easily distributed around the country as needed, or as economics dictate.



There are two basic approaches to using solar energy: thermal and photovoltaic. Everybody knows that the sun can be scorching on a hot summer day. Even on a frigid day, sunlight streaming through a window can warm the area on which it falls. Thermal schemes seek to harvest and use this heat. Schemes can be as complex as large solar generating stations in the desert, or as simple as common design elements of an individual home. “Photovoltaic” means “energy from light.” When sunlight falls on a photoconductor, electricity is generated: the stronger the light, the more the electricity.

The main barriers to solar power historically have been that, compared to power generated from hydrocarbons, it was expensive, it fluctuated, and it was inconvenient. Solar has been most desirable where no energy grid has been available. However, recent increases in hydrocarbon costs, increased concern about their negative health and environmental effects, decreases in solar costs, and the availability of net meteringⁱⁱⁱ are making solar power more competitive. In the future, it may become more cost effective and desirable than any other energy source.

In the following white papers, we will discuss several aspects of solar energy.

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- ⁱ TOE = tonne of oil equivalent, the amount of energy in a metric ton of oil. The amounts come from *Solar energy*. Wikipedia. Retrieved online 12/31/2007 at http://en.wikipedia.org/wiki/Solar_energy. See also Nersesian, Roy. (2007) *Energy for the 21st Century*, Armonk, NY: M.E. Sharpe, p. 318. See also Lomborg, Bjorn. (2001). *The skeptical environmentalist*. Cambridge, England: Cambridge University Press, p. 132.
- ⁱⁱ Nersesian, Roy. (2007). *Energy for the 21st Century*. Armonk, NY: M.E. Sharpe.
- ⁱⁱⁱ Net metering is the practice of selling power generated at individual homes to the power grid. When the sun doesn't shine, the individual draws power from the grid. But when the sun does shine, and the individual homeowner generates more power than he or she uses, the power is sold back to the grid for others to use. The individual homeowner pays only for the difference, or net, between the power drawn and supplied to the grid.