

Clean Power from the Sun - and it's FREE!

By Gil Woolley

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The immense power of the sun can be harnessed for use by humans in two basic ways: Thermal, in which infrared radiation generates heat and Photovoltaic, in which solar radiation generates electricity.

Thermal is the easiest to understand and to use. From the earliest times, homes have been built to take advantage of solar heating. Solar collector panels are used primarily to heat water for domestic and commercial purposes.

Thermal radiation can also be used to generate electricity. Mirrors focus solar radiation onto a steam boiler and the steam is used to generate electricity, using conventional technology. Several large installations are on line in the US,

Photovoltaic: this source of electricity is based on the "Quantum Effect". Quanta of energy in solar radiation are captured by semi-conductor materials in photovoltaic cells and electrons are released. The typical voltage produced by a single cell is only 0.5 volts but cells can be interconnected into arrays: in series to provide a useful voltage, and in parallel to provide a useful current.

The first useful photovoltaic application was to power satellites. Early commercial applications supplied electricity in locations far from power lines, such as a radio relay station in the Australian desert and traffic signs on I 495, in Massachusetts. Small arrays supply power to calculators, mobile 'phones and many other appliances where a large amount of power is not required.

At the other end of the range are large arrays, used in most industrial nations, to feed power to the grid, but at present this is only competitive when there is a subsidy of some kind. As the volume of arrays produced increases, however, costs will go down and it may soon become commercially possible to use desert areas, as in the Southwest of the US and North Africa, to house very large numbers of arrays..

Theoretically, solar power could provide all the energy needed by the industrial world, but this would require an immense capital investment and a considerable length of time to build. It would, however, reduce dependence on imported oil and gas, reduce pollution and nearly put an end to the human contribution to Global Warming.

So what can we do to encourage the use of non-polluting solar power? We can install photovoltaic arrays on our premises. Not only will this supply a part of our own needs, but, at times when we do not need all the electricity generated, Massachusetts (and many other states) requires the utility to purchase this power and to pay the average monthly rate for it. We become generators.

In addition to a photovoltaic array, an "inverter" is also required to turn the DC (Direct Current) generated by the photo-voltaic array into 120 volt AC (Alternating Current) supplied by the utility This will cost several thousand dollars but will pay for itself over ten years or so. The more electricity you use, the quicker the payback

Your contact at the Massachusetts Department of Telecommunications and Energy is Barry Perlmutter at (617)305-3659. In Newton your electricity supplier is NSTAR.

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