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The Potential of Community Solar Power

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By the MOTHER EARTH NEWS editors

Terrestrial solar cells, perhaps as part of community solar power systems, could provide as much as 30% of power in the U.S. according to some photovoltaics experts. PHOTO: FOTOLIA/iTAKE IMAGES

Imagine a wafer-thin sheet of pure sand that's capable of converting sunlight directly into electricity and you can begin to appreciate the excitement—and, perhaps, a bit of the confusion—that's caused by each new development in the photovoltaic industry.

The phenomenon of solar-generated electricity has been investigated for decades, but the necessary cost has limited its use in the ordinary home. Recently, however, advances in the production of solar cells (the layers of silicon that convert sunlight into electricity) have dramatically dropped the prices of these "miniature powerplants," rapidly making the solar panels a more and more economically feasible alternative to conventional sources of electricity. In fact, according to sun-power experts Paul Maycock and Edward Stirewalt, "Photovoltaics will be fully economic for massive private use before a major utility can design, purchase, and install its next new nuclear reactor."

The comparison between solar cells and nuclear power is important in more than merely an economic context. Silicon cells consume nothing but sunlight while in operation, and—because they create no material

by-products—they generate no pollution (although some is caused by their manufacture). Moreover, since photovoltaic systems can be used on an individual household or neighborhood scale, they're particularly suitable for community solar power projects aimed at providing a measure of local energy self-reliance.

Given such environmental and (assuming that technical advances will *continue* to lower the cost of solar cells) economic advantages, then, it would seem that locally operated photovoltaic facilities ought to begin to pop up all over within the next few years. Unfortunately, this may not be the case. The question of whether (and how) solar power can actually provide enough electricity to meet the nation's future energy needs has directed much of the research *away* from small-scale systems, in effect putting the reality of local energy-generating setups *further* out of reach.

The main drawback of the silicon cells, of course, is that they produce electricity only when the sun shines ... thus working at less than full capacity (about 50%) on cloudy days and not at all during the night. And in an attempt to solve the problem of inconsistent energy production, a great deal of research has been conducted on the solar power satellite (SPS) concept ... an energy-gathering system that involves launching satellites into orbit about the earth, where they'd be constantly exposed to the sun's radiation and thus could continuously relay energy to giant ground-based facilities. However, though the U.S. government has already spent well over $26 million merely *investigating* the SPS idea, recent findings indicate that such a system isn't feasible at this time.

According to Scott Denman, a member of the Citizens' Energy Project (an effective grassroots organization in Washington, D.C.), electricity produced by solar power satellites would bring with it a host of problems. Citing a study done by the Department of Energy and NASA, Denman stated that—for instance—an SPS system would cost over $1 trillion to set up ... its construction would tear up thousands of acres of land ... and the energy waves that the satellites relayed to earth would disrupt radio signals. Furthermore, the SPS design is such that the nation's entire utility network would be placed in a few hands rather than under the control of individuals in a community, as would be the case if "down to earth" systems were used. And finally, it's possible that—in the event of a war—a hostile foreign power might be able to knock some, or all, of the satellites out of service.

In the light of these findings, the Congressional Office of Technology Assessment asked ILSR to compare a solar power satellite program with an earth-based solar collector plan. Photovoltaics in the earth-based design would be placed on rooftops, the sides of buildings, or any spot where they could produce electricity without interfering with other activities. Homeowners and businesses operating such facilities would become power *producers* as well as consumers. Utilities would merely act as "energy brokers," providing electricity when the solar installations failed to meet the energy demand and buying power from those solar cell owners who produced an excess of electricity.

The results of the study were encouraging in regard to the community-operated systems. It was discovered that even if the cost estimates of the SPS setup could be met, it would still be less expensive to generate the same amount of power by means of equally efficient earth-based photovoltaics. And, because of the time required to develop a satellite system, facilities on the ground (which would be small and easily installed) could become cost-competitive years earlier.

In addition, contrary to what was originally believed, earth-based solar cells could generate the same amount of electricity—even though they're unable to operate at night—as could the space-launched silicon cells. Rooftop solar collectors would be able (in most regions) to meet all the energy needs of a home during the day, and also store excess energy in batteries for evening use. Businesses could also operate on this system,

with those firms that require more energy than they produce being interconnected, by means of a grid system, to other manufacturers who are able to generate a surplus of electricity.

Since the conclusion of the study, another significant government report has further confirmed the advantages of a decentralized, earth-based photovoltaic system. The National Academy of Sciences found that the solar power satellite "compared poorly on technical and economic grounds with advanced coal technologies and terrestrial solar cells." The NAS also maintained that the original cost estimates for the SPS project were too low and put the actual projection closer to *$3 trillion*.

As a result of these studies, it's not surprising that enthusiasm for the SPS concept has cooled considerably. Congress, in fact, plans to discontinue all funding for solar power satellite research. Unfortunately, though, no government effort is being made to promote the highly feasible alternative of decentralized earth-bound solar-cell use. According to photovoltaic experts Maycock and Stirewalt, our country could derive as much as 30% of its energy from sunlight by the turn of the century. But as Daniel Yergin, coauthor of the book *Energy Future: Report of the ENergy Project at the Harvard Business School*, comments, "No technology is 'inevitable'. Rather, its eventual success is much affected by political, economic, and social decisions." If the United States is to realized the potential of solar power in creating energy-self-sufficient communities, we—as its citizens—must take immediate action to insure that the proper legislation is enacted.

Readers interested in taking a closer look at solar electricity might want to read Paul Maycock and Edward Stirewalt's excellent introductory book, Photovoltaics: Sunlight to Electricity in One Step. *Two other good sourcebooks on the subject are* Making and Using Electricity From the Sun *by the technical staff of Solarex Corporation, and Rufus P. Turner's* Solar Cells and Photocells.

For the past several years, the good folks at the Institute for Local Self-Reliance in Washington, D.C. have worked to help urban residents gain greater control over their lives through the use of low-technology, decentralist tools and concepts. We strongly believe that more people (city dwellers and country folk alike) should be exposed to the Institute's admirable efforts ... which is why we've made this "what's happening where" report by ILSR staffers one of MOTHER EARTH NEWS' regular features.