



CLIMATE DECISION MAKING CENTER

Carnegie Mellon University

Will Solar Power's Future be Bright?

Solar cell technology will need a fair share of research money to get going

The sun provides the earth with enough energy in one hour to satisfy a years' worth of the world's needs. This readily available energy gives us a way to create electricity and heat without emitting carbon dioxide, one of the main causes of global warming. So shouldn't we be making use of it more than we have been?



Solar photovoltaic cell panels integrated into a back porch awning

able right now for converting light energy to electricity. They are used in the shiny panels you see on rooftops or on roadsides, powering traffic signs. There are many types of PV cells available, made from different materials that lead to differing performances. Researchers are constantly studying and trying to create newer and better designs. In fact, they're working on a new, third generation of PV cells currently.

Analyzing the benefits and drawbacks of these technologies tells us which ones could be improved and made usable soon, she says. The third generation is still a while away from being practical, she adds, but some technologies in the second generation could become less expensive in about a year.

One way to bring down the cost is to do more basic technology research—better solar cell materials and more

We have enough technology available to take advantage of the sun's energy. But unlike sunlight, this technology costs money. In fact, solar energy is currently five to ten times as expensive as energy we get from burning coal.

“To reduce that price we need to make good research and policy decisions for solar technology right now,” says Aimee Curtwright, a post-doctoral researcher at the Climate Decision Making Center (CDMC). These decisions will shape the future of solar power. To make intelligent choices, she adds, we need to understand present-day solar energy technology, estimate how it will advance, and then make the best judgment we can.

Curtwright, who has a Ph.D. in electro-chemistry, is studying photovoltaic (PV) cells, which are the best tools avail-



A solar roof-installation glints in the sunlight

efficient designs decrease costs. Other factors that can reduce cost significantly are lower production costs and higher production capacity. For the past 13 years, as manufacturing plants have become larger, the cost of PV modules has gone down. Another important thing that adds to the module's cost is the cost of other equipment that goes with it, such as batteries that store electricity for the night and inverters that convert DC electricity into AC.

And then there are some inescapable factors that could affect the progress of solar power, including how much money is being put into the research and whether it's consumers find the option attractive.

Increased research money in certain areas of PV technology would lead to breakthroughs that create even better, cheaper PV cells. This increases their demand, which slashes prices even further, and could lead to more research money.



Brazilian homes use 50 Watt photovoltaic systems for lighting.

Some second generation technologies are ready for use in the market right now, given the right financial incentives and some more tweaking. But others are still immature and need a push in basic research. Researchers don't know how these younger tech-

Solar Energy Facts:

The earth receives more energy from the sun in just one hour than the world uses in a whole year.

Japan and Germany lead the world solar market.

The biggest state market in the U.S. is California, with New Jersey coming in second.

Solar energy costs 5-10 more than the energy from coal.

Source: www.solarbuzz.com

nologies will shape up in the future. "We're not going to know exactly which new technologies there are going to be, or exactly how much they're going to cost, or how much they'll cut back carbon-dioxide," Curtwright says. But despite those unknowns, "someone needs to make an intelligent decision right now."

She plans to analyze the issues associated with various technologies, get further insight from solar power experts, and develop a portfolio of promising PV technology. This will provide policy-makers with data to make more informed decisions. "It should help in allocating research money," she says. "In making choices between basic research in technology that's not going to be ready for use for thirty years versus fine-tuning the engineering in near-term technology."

Where the money goes will make all the difference in solar energy technology, Curtwright believes. Through the CDMC, she hopes to guide the science and technology policy decisions that will let us take advantage of the abundant solar power available to us, without having to worry about paying too much.

The Climate Decision Making Center (CDMC) is an interdisciplinary collaboration between scientists at eight research institutions spanning the U.S., Canada and Germany. The center is anchored in the Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA. It is funded by the National Science Foundation and was formed to develop and demonstrate a set of new decision analysis tools for addressing problems which involve high, and often irreducible levels of uncertainty.