

Harvesting the sun in the Valley

UC Merced is leading the way in green solar technology to power the world.

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Anyone who has lived in the San Joaquin Valley knows that if there's one thing we have plenty of, it's sunshine.

The many months of sunshine contribute mightily to our agricultural bounty and is a reason that many people choose to live here.

Now we're on the verge of seeing the sun in a new light -- as the way to produce much of the energy we need to power our households, businesses and factories.

For all the talk about solar power in the past few years, it's still a very small part of the power Californians use. In 2009, solar accounted for less than 1 percent of the power generated in the state, according to the California Energy Commission.

The largest solar installation in our region is at UC Merced. Its nine-acre array of panels produces about 20 percent of the electricity for the campus.

Since 2007, when the Modesto Irrigation District initiated its solar program, only 97 households and 15 businesses have completed solar installations. All of them are creating power for their own use.

But the district has approved a contract with SunPower Corp., which plans a 160-acre solar farm on McHenry Avenue north of Patterson Road. MID will purchase the power, up to 25 megawatts, generated at the privately owned facility, which is expected to be up and running by mid-2012.

And, just this month, SunPower signed a contract with Southern California Edison to build a major solar facility on 1,000 acres near Santa Nella. It would generate 110 megawatts, enough to meet the demand from about 71,000 homes, and is expected to be complete by 2014.

Solar facilities are likely to be spread around California, but the San Joaquin Valley has a significant edge in one regard -- some of the most advanced research of solar power is taking place right here at UC Merced.

Last week, The Modesto Bee's editorial board met with three solar experts -- Roland Winston, a founding member of the UC Merced faculty and an acclaimed inventor and educator in the field of solar energy; Ron Durbin, director of development for the UC Advanced Solar Technologies Institute and part of UC Merced's School of Engineering; and Paul McMillan, principal in the utility and power plants unit of SunPower Corp.

It's no surprise that they see great potential for solar -- or that their enthusiasm is contagious. At the meeting -- the full video of which is available at videos.mercedsunstar.com -- they also answered some of the most common questions about solar.

Here are some highlights:

What are the advantages of solar power? First, its abundance -- it's everywhere and especially here in the Valley. Second, it doesn't have the same negative byproducts as other sources -- coal, natural gas and nuclear.

The biggest drawback is expense. But technology improvements are being discovered quickly to make solar less expensive. Efficiency and affordability are the focuses of the UC Advanced Solar Technologies Institute, which includes faculty from Berkeley and Santa Barbara and is based at Merced.

The research team has designed and developed a low-cost, high temperature, nontracking solar thermal collector, which could be used for solar heating, cooling, desalinization and food processing. A 25-kilowatt demonstration project, the first of its kind in the world, is under construction at UC Merced.

Solar photovoltaic has been getting the most attention, but much of the world is far ahead of the United States with solar thermal -- using solar to heat water. Much of the world's domestic hot water now comes from solar thermal systems, which also can be used to cool.

Where should solar systems go? One thought is almost anywhere, because it takes only a few square meters of cell to generate usable amounts of power. Researchers are looking into putting solar on windows, for instance.

UC Merced's nine-acre solar array was placed on good farmland, but the topsoil was removed and used elsewhere. Desert land can seem like a good idea, but there are transmission costs and the challenges of rare animal and plant species. Foothills might seem ideal for solar panels but only if the slopes are in the right direction. The topography can make installations more difficult.

California State University, Fresno, has solar panels atop its covered parking lots, giving double benefits: A cooler, shaded place for parking, and a rooftop designed to capture sunlight.

Why can't there be solar panels on every home? Such installations have to be reviewed case by case to see if they make financial sense. Factors include the angle and direction of the roof, interference from trees or other obstructions, how long the family expects to live in the house, the cost of power currently used, and utility company rules. The bottom line for homeowners is how long it takes for the solar installation to pay for itself.

Will the Valley's infamous air pollution interfere with solar production? It shouldn't. The panels are designed to need washing a couple of times a year, and sunlight gets through even when there's dust. More important, says UC Merced's Winston, the air pollution problem is an incentive to get more power from solar -- a clean source - - and to reduce the burning of natural gas and other fuels.

Is solar just a passing fad or is it really going to materialize as a major source of U.S. power? In the 1970s, solar also was much touted, but by the 1980s, those seemed like broken promises. "The pieces are coming together for the real thing now," says McMillan. The UC Merced experts agree.