

Ferguson: Energy Matters

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Big Solar

When most folks think about solar power, they think of panels on roofs or the Sacramento Municipal Utility District's panels at the Sacramento airport. They are surprised to hear that considerably more solar power is generated by what I refer to as "big solar," which turns sunlight into electricity in a very different way.

California is home to utility-scale solar projects located in the vicinity of Kramer Junction in the high desert with a total capacity of several hundred megawatts. Unlike photovoltaic panels that use silicon to convert sunlight directly into electric energy, the existing big solar projects use curved mirrors to focus sunlight onto an oil-filled pipe. The heated oil is used to create steam that powers a conventional steam generating unit.

The efficiency with which these plants turn solar energy into electricity is about three times as high as the efficiency of photovoltaic panels, making the electricity considerably less expensive. Current estimates for the cost of electricity from new concentrating solar plants are 15-20 cents per/kWh.

The nice thing about solar power of any kind is that electricity is produced when the grid needs it most. This should come as no surprise since the sun that generates electricity is the same sun that heats up urban areas and makes people crank up their air conditioners. The rapidly increasing cost of gas-fired peaking power is approaching the declining cost of electricity from concentrating solar plants.

The bad news is that only one big solar plant has been built since 1990, and that was recently in Nevada. The good news is that many new ones have been proposed in California, and a large facility was announced this week for Arizona.

According to the *Wall Street Journal*, Arizona Public Service has reached agreement with Abengoa Solar Inc., a Spanish company, to build a 280 MW facility. That's big solar, indeed. In addition to collecting heat from the sun, the facility will have thermal storage capacity that allows the plant to be dispatched when APS needs the electricity most. The contract is reportedly for 30 years at a price of 14 cents/kWh.

For California to meet its long-term renewable energy goals, it will need perhaps as many as 30 plants of this size. Since the Arizona plant will cover 3 square miles, something like 100 square miles of

desert will be required for California. Finding that much land for development isn't easy.

The Bureau of Land Management recently declared that some 25,000 acres of desert land in the vicinity of Ridgecrest was off limits to solar development to protect habitat for the Mojave ground squirrel. Solar developers were shocked by the decision, since earlier indications were that they could mitigate any negative impacts on squirrel habitat. Evidently, BLM hopes to use the Ridgecrest area to mitigate impacts in other regions.

I find it ironic that military uses of the desert are unquestioned, while solar energy development must compete with the squirrels for space.

Is the U.S. serious about energy independence or not? On second thought, since the Department of Defense budget is approaching one trillion dollars per year, the priority isn't surprising. The military recently announced that it is interested in leasing unneeded land under its control to solar developers. Whether this offer is more than green window dressing remains to be seen.

In addition to the conventional curved mirror trough collectors, a host of competing solar technologies are clamoring for attention. Perhaps the most well known uses parabolic dish mirrors to focus sunlight on small 25 kilowatt Stirling engines. This technology has been kicking around for decades but has yet to make it out of the prototype stage. Nevertheless, San Diego Gas & Electric and Southern California Edison have signed large contracts for Stirling systems should they ever become commercially viable.

A second competitor uses a host of mirrors to reflect light onto a central "power tower" that collects heat to make steam. Yet another uses a collection of mirrors in a Fresnel configuration to replace the troughs. Not to be outdone, two companies believe they can make large quantities of photovoltaic panels cheap enough to compete with concentrating solar.

Big solar is a hot item these days. Land use conflicts and the need for new transmission are daunting roadblocks, however. California has made aggressive noises about increasing its reliance on renewable energy, but whether it is willing to put its money where its mouth is and solve the problems facing big solar remains to be seen.

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Opinions expressed by DrF are not necessarily those of any organization with which he is affiliated.