

## **DOE Backs Photovoltaic Start-Ups With \$27M**

By Yuliya Chernova (Yuliya.Chernova@dowjones.com)

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The Department of Energy will fund 10 photovoltaic technology start-ups with up to \$27 million through a new milestone-based grant program.

Hedging its bets, the department is backing a broad range of early-stage developers, competitors among them, each aiming to reduce the scourge of solar: high cost per watt.

Two recipient companies, Blue Square Energy Inc. and CaliSolar Inc., use cheaper, lower-grade polysilicon to make equally powerful PV cells. Four recipients, Enfocus Engineering Corp., MicroLink Devices Inc., SolFocus Inc. and Solaria Corp., work on increasing efficiency through solar concentration methods. And four: Ava Solar, Plextronics Inc., PrimeStar Solar Inc. and SoloPower Inc., develop technology for thin-film PV modules that avoid expensive polysilicon altogether.

Each project will receive between \$2 million and \$3 million from the DOE through the Photovoltaic Module Incubator program after presenting the energy department with functioning prototypes of its products. The companies also committed to invest about \$44 million combined in addition to the federal contribution, mostly coming from financial backers such as venture capitalists.

The DOE evaluated 56 applications in this first round of the program that will make grants every nine months and required that chosen projects are at or near pilot-run stage, scalable through an affordable manufacturing process and are based on significant innovation compared with current products on the market.

"The program is structured around tight milestones, focuses on delivering proof of hardware, and moves quickly," said Craig Cornelius, acting program manager for the DOE's Solar Technologies program. The DOE would evaluate the progress of its portfolio companies at least every nine months when it

would also issue grants to new applicants, he said. The advantage of requiring shipment of hardware samples to the DOE, said Cornelius, is that it "frees companies from government paperwork to focus on what they do best: tech development."

Unlike most of the companies in the batch, SoloPower, Milpitas, Calif., has already produced solar cells capable of delivering 1 megawatt of power. The company expects to make cells with a capacity of 20MW of power within 18 months, at a planned development cost of \$29.3 million, including \$2.4 million from the DOE. SoloPower cells are fabricated on copper-indium-gallium-selenide, or CIGS, using electroplating, uncommon among solar technologies.

Chief Executive Homayoun Talieh said SoloPower is within weeks of closing a new round of financing, having raised \$10 million in mid-2006 from multi-stage venture capital and hedge fund investor Crosslink Capital, fund manager Firsthand Capital Management Inc. and individual investors.

While SoloPower cells are fabricated on CIGS, other companies are using different chemicals, such as cadmium telluride in the case of two Colorado-based start-ups, AVA Solar and PrimeStar Solar. These companies are looking to the success of publicly traded counterparts like First Solar Inc., a producer of thin-film solar cells that also uses cadmium telluride.

PrimeStar Solar, of Longmont, licenses intellectual property from the National Renewable Energy Laboratory and says its cells will be more efficient than First Solar's. The company plans to use the DOE funding along with about \$11.6 million of its own money to prepare for commercialization within 18 months or so. At that point it aims to produce PV cells with 3 megawatt capacity in total.

The company employs about a dozen people and has raised more than \$6 million from individual investors and an investment bank. Its Chief Executive Brian Murphy said PrimeStar is looking at sourcing further funding right now, but declined to comment further.

AVA Solar, of Fort Collins, also projects to have 3MW of solar power at the end of 18 months, which will require about \$16 million of investment, some of which would come from the DOE. The company has cells with 0.1MW capacity currently.

For Plextronics, solar isn't its only market. In fact, the company, which develops non-silicon special inks, is already marketing its inks in the semiconductor market. Its first customers in the solar market would probably be developers of solar cells for off-grid applications like handheld devices, said Andrew W. Hannah, president and chief executive of the Pittsburgh company.

"Right now we're fully capitalized, so 2008 will be a new year for raising capital," said Hannah. Plextronics, which has 42 employees, brought in \$13.1 million in Series A funds last year from venture firms Birchmere Ventures, Draper Triangle Ventures and Firelake Capital Management.

Some of the selected start-ups are already nearing commercialization in the solar market. SolFocus, founded in 2005 in Palo Alto, has signed a contract for its first commercial installation in Spain and will use the DOE grant to make improvements to its current high-concentration photovoltaic panels. The company expects to produce cells that concentrate sunlight by a factor of 500, with 10 megawatt capacity within 18 months to enable large-scale commercial and utility market installations.

While SolFocus is focusing on means to concentrate sunlight, another DOE-backed company, MicroLink Devices, is developing a high-efficiency solar cell which can be used in concentrator systems like that provided by SolFocus. Niles, Ill.-based MicroLink expects its cells to have 25MW capacity within 18 months. The company already has cells with 1MW capacity now.

Backed by \$32 million in 2006 from New Enterprise Associates, SolFocus, which employs 50 and subcontracts manufacturing, will be considering raising new funding at the end of the year, said Director of Corporate Marketing Nancy Hartsoch.

Enfocus Engineering, also developing concentrating solar technologies out of its Sunnyvale, Calif., headquarters, focuses on the rooftop market rather than utilities. According to the DOE, Enfocus is working on lightweight, high concentration PV modules that are fully encapsulated and protected from wind, hail, dust and moisture. It uses multi-junction cells for greater efficiency. The company expects to spend \$3.9 million for its project, with \$2 million provided by the DOE.

With its low-concentration PV modules, Solaria targets both utility and commercial markets. The Fremont, Calif., company takes existing solar cells and reconfigures them to make two cells from the amount of silicon typically used in a single cell. Solaria raised \$22 million in Series B funds last year from Sigma Partners, NGEN Partners and corporate backers Q-Cells AG and Moserbaer India Ltd.

Another venture-backed start-up receiving DOE funds is CaliSolar. The Sunnyvale company raised \$9 million last year from Advanced Technology Ventures and Globespan Capital Partners. It currently has zero megawatt capacity, but expects to reach 6MW within 18 months by using metallization methods to use low-cost, impure metallurgical silicon to manufacture solar cells.

Also working on lower-grade silicon is North East, Md.-based Blue Square Energy, whose approach is to grow a high-purity silicon layer onto a metallurgical-grade silicon substrate.