

ORNL hybrid lighting technology gaining momentum around nation

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With five hybrid solar lighting systems already in place and another 20 scheduled to be installed in the next couple of months, the forecast is looking sunny for a technology developed at the Department of Energy's Oak Ridge National Laboratory.

Preliminary data from field units, which collect sunlight and pipe it into buildings using bundles of small optical fibers, show potentially significant energy savings in lighting and maintenance costs. An added benefit is that, for most uses, natural light is vastly superior to artificial light.

"This is the ultimate 'green' technology," said Duncan Earl, a co-developer of the technology and chief technology officer of Oak Ridge startup company Sunlight Direct, which licensed the technology from ORNL last year. "In fact, we have received many inquiries and are working with several organizations that are aiming to build LEED- (Leadership in Energy and Environmental Design) certified buildings."

The U.S. Green Building Council established the LEED designation for buildings that comply with a national consensus standard for design and construction of "green" buildings.

The hybrid solar lighting technology uses a rooftop-mounted 48-inch diameter collector and secondary mirror that track the sun throughout the day. The collector system focuses the sunlight into 127 optical fibers connected to hybrid light fixtures equipped with diffusion rods visually

similar to fluorescent light bulbs. These rods spread light in all directions. One collector powers eight to 12 hybrid light fixtures, which can illuminate about 1,000 square feet. During times of little or no sunlight, a sensor controls the intensity of the artificial lamps to maintain a constant level of illumination.

Over the next several months, researchers in ORNL's Solar Technologies Program will continue to perform beta testing of the units, installed or being installed at various locations around the nation, including Sacramento Municipal Utility District customer service headquarters, San Diego State University, University of Nevada, Las Vegas, a Wal-Mart in McKinney, Texas, Pacific Northwest National Laboratory, a Staples store in Long Island, N.Y., and Aveda Corp. in Minneapolis.

"As part of ORNL's Sunlight Inside Initiative, a field-trial demonstration program, we will be gathering energy, cost and reliability data and publishing a report," said Melissa Lapsa, manager of the lab's Solar Technologies Program.

The system can save about 6,000 kilowatt hours per year in lighting and another 2,000 in reduced cooling needs for a total of 8,000 kilowatt hours annually, according to Sunlight Direct estimates. Over 10 years, for parts of the country where the utility rates are 10 cents per kilowatt hour, that can result in savings up to \$8,000 per hybrid solar lighting unit. For large floor spaces – 100,000 to 200,000 square feet – this translates into energy cost savings of between \$1 million and \$2 million over 10 years, according to Sunlight Direct. Operation and maintenance savings could account for another \$300,000 in savings over the same period.

"The great thing about hybrid solar lighting is that we're getting peak light output during the time when there's the greatest demand for electricity," said Bill Lekas, energy manager at San Diego State

University. "That saves us energy during the part of the day when electricity costs the most, and the reduced demand could reduce the incidents of rolling brownouts."

If market projections prove accurate, within five years 5,000 hybrid solar lighting systems could be installed in regions of the nation where solar availability and electricity rates make this technology cost effective, saving 50 million kilowatt hours per year. Retail applications are the most likely first market for this technology, Sunlight Direct's Earl said.

The challenge over the next 18 months is to reduce the cost from about \$12 to \$4 per square foot. With larger collectors and other design improvements, researchers say they can achieve that goal. When that happens, businesses in regions where electricity is most expensive could pay for implementing the technology in three to five years with savings in electricity bills alone, according to Earl.

In addition to the environmental and financial incentives – which include a 30 percent tax credit – proponents of hybrid solar lighting note that the higher quality of natural light leads to increased productivity and improved sales in retail outlets. They also note that hybrid solar lighting avoids the environmental problems associated with generating and transmitting electricity.

This technology was developed through funding by DOE and TVA in partnership with utility companies, state energy agencies, industry and universities.

Source: Oak Ridge National Laboratory

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