

Harnessing the Power of the Sun To Recharge the Trailer Battery

By Thomas M. Strah
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Considering that all batteries have a finite life span, harnessing sunlight is one way to keep tracking systems running for long periods on far-flung trailers.

Solar power "is not a flash in the pan; it is here to stay," said Thomas Konditi, head of General Electric's VeriWise Asset Intelligence division, which recently purchased competing Terion Inc. to bolster its own position in the tracking market. Terion, too, offers solar power.

In the GE system, an optional solar panel extends the life of its military-grade battery with a trickle charge when the trailer is uncoupled — "untethered," in industry parlance — and can't draw power from the tractor.

"We have been very successful with this combination," said Joe Jesson, chief technologist for GE's tracking product. "When you stop receiving calls about batteries dying or units not powering up, that is when you know that the field response is where it should be."

Last March, GE Fleet Services signed a deal to equip 46,000 trailers in Wal-Mart's private truck fleet with the VeriWise system and solar battery-charger.

Terion offers a "self-sustaining" solar antenna that the company said provides enough energy from the sun to maintain a full battery charge in an idle trailer in most locations. A trickle-charge option is available.

But solar power may not yet be all that customers want or expect when it comes to maintaining a spark of life in a semitrailer whose tracking battery is about to peter out.

Bill Purdie is president of MobileNet, which specializes in mobile data delivery, primarily for the railroad, utility and heavy construction industries. He said solar is providing value in asset-tracking — within limits.

"I use solar on some trailers and on some rail cars," Purdie said. "The disadvantage is size, cost and low efficiency, all of which have limited solar-system deployment."

As its electrical conversion efficiency improves and the cost of mass production comes down, however, Purdie believes solar's usefulness will grow.

Basically, untethered-trailer power comes from an onboard lead-acid battery or a pack of lithium batteries. Each format has its pros and cons. As in all such things, the real key to longevity is the power drain. The more the tracking system is used, the greater the strain on the batteries.

The lead-acid battery may lose its useful power in a matter of weeks, but it can be recharged. Completely

draining the battery sharply reduces its useful life. Replacement cost ranges around \$100, for comparison's sake.

A pack of eight AA lithium batteries, such as those used by SkyBitz, lasts four to five years in general application but has to be replaced when drained. Replacement cost reportedly is closer to \$40.

Conserving power is another approach to extending battery life. TransCore's Global Wave system depends on lithium batteries, which the company said can last up to seven years in its smallest data terminal.

GeoLogic's Mobile Max relies on software to regulate power management.

Today's chip sets for getting fixes from the global-positioning system of satellites are "very processing-intensive and very power hungry," said Craig Malone, GeoLogic's vice president of product development. The software does a calculation "in the background

Rechargeable versions are on the market, largely for personal electronics, but safety concerns cloud the picture. Numerous fires in portable equipment have been traced back to lithium batteries.

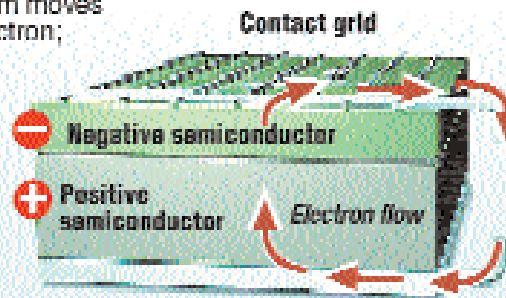
Robertson believes solar will not emerge as a major force in trailer-tracking until it can overcome a number of disadvantages.

David Roscoe, vice president of engineering and research for TransCore, which produces a range of Web-based transportation management systems, said his company still finds solar's capabilities too restricted for trucking's most immediate needs.

"We don't do solar on trailer-tracking applications, primarily because of concern about reliability. And availability of the solar charge could be compromised by external conditions — clouds, trailers parked in garages — and also the physical state of the solar cells," Roscoe said.

How a solar cell works

- 1 When the cell absorbs a photon, an electron is freed from its atom; the negative semiconductor attracts the electron.
- 2 An electron from a nearby atom moves to fill the place left by the first electron; another electron fills the second electron's place.
- 3 Electron flow (electric current) is collected by metal contact grid, which carries the current from the solar cell to be used in home appliances; electrons return to the positive side of the solar cell.



Impurities essential to cell

- Pure silicon** is a poor electrical conductor
- Phosphorus** added to silicon lets electron current move through the cell
- Boron** is another element that can be added to make the cell a "semiconductor"

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to make sure we're not draining the battery." A warning pops up on screen indicating "that you could consume too much power."

To send a signal or a report to the user, the Mobile Max also automatically first selects a lower-cost cellular network for transmission. If cellular service is not available, it switches to a more expensive satellite link.

As MobileNet's Purdie said, "I need a little more energy to hit a satellite 550 miles away, rather than a cell tower eight miles away."

Jerry Robertson, president of Bolt Inc., a software company that runs its own trucking operation, believes batteries are the technology star of the moment.

"It's really the long-life, nonrechargeable [lithium battery] that's making the biggest breakthrough right now," he said.

Lithium-based batteries are widely found in mobile electronic equipment, including laptop computers.

Covering of dirt or debris can severely degrade a solar cell's performance, he said.

Konditi believes that GE has made progress on some of these issues with its VeriWise system. Reducing the size of the trailer-top unit provides an advantage.

"There are different players using solar panels, taking very different approaches," he said. "If they are using solar as a solitary means of charging, it is required to have a larger panel. In a top-off mode like we are using, you can get away with less expensive and smaller units."

The GE Veriwise solar trickle charger is 11 inches long and 5 inches wide; it protrudes 3/4 inch from the trailer surface. The unit produces 1.25 watts of power and reportedly can withstand the 50-mph impact of a 1-inch hailstone. ♦

Freelance journalists Dan Calabrese and Peter Fretty contributed to this report.