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GREENTECH

Power to the People: Run Your House on a Prius

By JIM MOTAVALLI

WHEN Hurricane Frances ripped through Gainesville, Fla., in 2004, Christopher Swinney, an anesthesiologist, was without electricity for a week. A few weeks ago, Dr. Swinney lost power again, but this time he was ready.

He plugged his [Toyota Prius](#) into the backup uninterruptible power supply unit in his house and soon the refrigerator was humming and the lights were back on. “It was running everything in the house except the central air-conditioning,” Dr. Swinney said.

Without the Prius, the batteries in the U.P.S. unit would have run out of power in about an hour. The battery pack in the car kept the U.P.S. online and was itself recharged by the gasoline engine, which cycled on and off as needed. The U.P.S. has an inverter, which converts the direct current electricity from the batteries to household alternating current and regulates the voltage. As long as it has fuel, the Prius can produce at least three kilowatts of continuous power, which is adequate to maintain a home’s basic functions.

This form of vehicle-to-grid technology, often called V2G, has attracted hobbyists, university researchers and companies like Pacific Gas & Electric and Google. Although there is some skepticism among experts about the feasibility of V2G, the big players see a future in which fleets of hybrid cars, recharged at night when demand is lower, can relieve the grid and help avert serious blackouts.

Willett Kempton, a senior scientist in the Center for Energy and Environmental Policy at the [University of Delaware](#), said the power capacity of the automotive fleet was underutilized.

Mr. Kempton is helping to explore the V2G capabilities of a fuel-cell bus and battery-electric vehicles. The technology is also well-suited for so-called plug-in hybrids, which are being developed by General Motors, Toyota and other automakers. Plug-in hybrids will use larger battery packs and recharge from a household outlet for 10 to 30 miles of electric-only driving. When modified, they can return electricity to the grid from their batteries.

Google has four Priuses with plug-in capacity at its headquarters in Mountain View, Calif. With some advice from P.G.& E., Google equipped one to supply power to the grid.

Keith Parks, an analyst at the Minneapolis-based utility Xcel Energy, offers what he calls a “pie-in-the-sky vision” for V2G in which a company would offer incentives to its employees to buy plug-in hybrids. The

parking lot would be equipped with recharging stations, which could also return power to the grid from the vehicles.

Both Xcel Energy and the federal National Renewable Energy Laboratory, Mr. Parks's former employer, are investigating V2G technology.

"We see this as a win-win," said Sven Thesen, director of P.G.& E.'s Clean Air Transportation office. The utility owns Sparky, a Prius converted to plug-in operation by EnergyCS of Monrovia, Calif.

"It's the first new use for the electric power infrastructure in 100 years," said Jesse Berst of Smartgridnews.com.

But the V2G vision is not likely to be realized soon because engineers are wrestling with battery technology, cost and weight. A word of caution is added by John DeCicco, a mechanical engineer and senior fellow for automotive strategies at the nonprofit group Environmental Defense. "It's hard to take seriously the promises made for plug-in hybrids with 30-mile all-electric range or any serious V2G application any time soon," he said. "It's still in the science project stage."

No automaker is selling a plug-in hybrid vehicle, but some ambitious people are making their own. Converting a stock Prius to back up the grid is much easier, and the guru for such conversions is Richard Factor, 61, an inventor from Kinnelon, N.J.

Mr. Factor says that small U.P.S. units, often used to provide backup power for computer servers, are inexpensive. His system, which he estimates would cost \$2,000 to \$4,000 to duplicate, incorporates a large U.P.S. mounted in his home and a long electrical cord to the Prius, where it connects through the car's built-in relay terminals. His system is designed to integrate with the grid, but he said more rudimentary systems could be built for as little as \$200.

During a recent six-hour power failure, Mr. Factor estimated that his 2005 Prius used less than one gallon of gasoline.

The V2G potential of Honda's full hybrid vehicles is unexplored, but the company is doubtful of using them to power homes. "We would not like to see stresses on the battery pack caused by putting it through cycles it wasn't designed for," said Chris Naughton, a Honda spokesman. "Instead, they should buy a Honda generator that was made for that purpose."

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