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HIS ENERGY BILL IS \$0.00

March 15, 2007 edition

A New Jersey civil engineer powers his home with solar panels and hydrogen tanks. Can it work in the mainstream?

By Jared Fleisher | Correspondent of The Christian Science Monitor
EAST AMWELL, N.J.

Mike Strizki lives in the nation's first solar-hydrogen house. The technology this civil engineer has been able to string together – solar panels, a hydrogen fuel cell, storage tanks, and a piece of equipment called an electrolyzer – provides electricity to his home year-round, even on the cloudiest of winter days.

Mr. Strizki's monthly utility bill is zero – he's off the power grid – and his system creates no carbon-dioxide emissions. Neither does the fuel-cell car parked in his garage, which runs off the hydrogen his system creates.

It sounds promising, even utopian: homemade, storable energy that doesn't contribute to global warming. But does Strizki's method – converting electricity generated from renewable sources into hydrogen – make sense for widespread adoption?

According to some renewable-energy experts, the answer is "no," at least not anytime soon. The system is too expensive, they say, and the process of creating hydrogen from clean sources is itself laced with inefficiency – the numbers just don't add up.

Strizki's response: "Nothing is as wildly expensive as destroying the whole planet."

Life free from the power grid

Strizki lives with his wife in a rural section of Central New Jersey. His 12-acre property is surrounded by trees and his gravel driveway leads to a winding country road. His 3,500-square-foot house has all the amenities, including a hot tub and a big-screen TV.

It was here, four years ago, that Strizki set out to do something that's never been done in this country – power his home completely through a combination of solar and hydrogen. "My motivation was, I saw what fossil fuels were doing to the environment," he says.

Strizki works for a company that installs solar panels. In previous jobs, he's helped integrate hydrogen fuel cells into cars, a boat, a fire truck, and an airplane. His latest project, the one involving his house, is an extension of that expertise.

The solar-hydrogen house took longer to complete than Strizki expected – a strict local zoning officer and the state permitting process caused delays, he says – but in October 2006, the

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system finally went online. The total cost, \$500,000, was paid for in part with a \$250,000 grant from the New Jersey Board of Public Utilities.

This is how it works

On sunny days, solar panels on the roof of Strizki's detached garage generate more than enough electricity to power his home. The excess electricity powers a device inside the garage called an electrolyzer, which transforms a tank of water into its base elements – oxygen and hydrogen.

The oxygen is released into the atmosphere, while the hydrogen is stored in 10 1,000-gallon propane tanks on Strizki's property. In the winter, when the solar panels collect less energy than the home needs, that hydrogen is piped to an air-conditioner-size fuel cell, located just outside the garage, which generates electricity.

The final piece of the equation is "The New Jersey Genesis," a hydrogen fuel-cell car Strizki helped design and now maintains for the New Jersey Department of Transportation. He can fill up the Genesis with hydrogen from his electrolyzer and drive it pollution free.

Strizki understands that few people can afford to pay hundreds of thousands of dollars for clean energy. Now that he's demonstrated his idea works, his goal is to make the system better and less expensive. (For example, the 10 propane tanks could be replaced by one high-pressure hydrogen tank buried underground.) With mass production, he believes he could get the price of the system, not including the solar panels, down to about \$50,000. (A new solar panel system can cost as much as \$80,000, Strizki says, but some states, including New Jersey, have offered rebates that cover up to 70 percent of the cost.) Strizki is seeking government grants and private donors for funding, and he's started a company, Renewable Energy International, which he hopes will one day market his product. He says he's already heard from potential customers: "We've been called by some A-list Hollywood types interested in powering their islands."

Hydrogen hurdles

Strizki's project proves that carbon-free living is possible right now, but renewable-energy experts are skeptical that hydrogen houses with hydrogen-run cars in the driveway will catch on anytime soon.

"There's no way your average person is going to want to buy five expensive pieces of hardware," says Joseph Romm, a former Department of Energy official who analyzed clean-energy technologies during the Clinton administration.

In addition to the high cost of the equipment, there's another huge hurdle that must be overcome if hydrogen is to become a viable clean energy: Although hydrogen is the most abundant element in the universe, it doesn't exist alone in nature; you can't just bottle it up.

To get at hydrogen, it must be processed from another source, such as natural gas, oil, coal, or water. According to the National Hydrogen Association, 95 percent of the hydrogen produced in the United States is made through steam reforming natural gas – a process that releases greenhouse gases into the air.

Strizki's method for making hydrogen is totally clean, but suffers from a different problem: Electrolyzers are only 50 percent efficient. By the time the electricity from his solar panels is converted into hydrogen, and the hydrogen converted back into electricity in the fuel cell, half of the clean energy he started with is used up.

Mr. Romm thinks it's a waste. That electricity would do more good toward reducing pollution if it was sent into the main power grid to displace other energy, he says. "[Strizki's system] doesn't get you that much environmentally," he says.

Romm is an advocate for clean-energy use – in recent books and articles he advocates a sharp cut in greenhouse-gas emissions within 10 years – but he's characterized hydrogen as an overhyped distraction that isn't ready yet to help toward that goal. He supports continued hydrogen

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research, but other technologies that are more developed could help the Earth much more and much sooner, he says.

Not ready for prime time

Robert Boehm, director of the Center for Energy Research at the University of Nevada, Las Vegas, has studied renewable energy for the past 35 years. His reaction to Strizki's home project is tempered.

"Does it make sense in the present environment? Probably not. Does it make sense as a sustainable thing in the future? It very well could," Dr. Boehm says.

Boehm predicts that it will be at least a decade before hydrogen energy is ready for the mainstream, and then only if enough money is put into research and development.

"In any of these new technologies, they need a lot of government support," he says.

Boehm sees the most immediate potential for a system like Strizki's in places far from a power grid, where selling renewable energy back to a power company is not an option.

Strizki isn't dissuaded by criticisms that his system is too expensive or too inefficient to be practical. He's determined to push technology ahead toward an end goal – totally clean energy – and he sees renewable hydrogen as the best solution.

"It's the way that makes the most sense, and we have to start somewhere," he says. "If you look at it, no one has said what I'm doing doesn't work."