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**Catching Rays Energy-Saving Solar Panels Are Back,
And Now They Can Generate Electricity**

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Following the path of the bell-bottom and the Volkswagen Beetle, another 1970s trend is making a comeback: solar energy.

Increasing environmental awareness, the soaring costs of heating oil, and last summer's record-high temperatures are making utilities and consumers again look to the sun for power.

While the solar panels that first hit the rooftops of homes to heat water in the late Seventies and early Eighties remain effective, technological advances have made it possible to convert the sun's rays into household electricity.

"It has mutated and come back," says Peter Kastl, director of housing and building technology at the New Jersey Institute of Technology in Newark. "It's not at the stage where people can go down to Home Depot and buy some, but it's coming."

Experts advise anyone considering the newest solar technology known as photovoltaics to look at it as a supplemental energy source because it cannot yet compete economically with electric and gas utilities. As a primary energy source, solar power is used mostly in rural areas not served by power grids, where it is cheaper than having utility companies

extend power lines.

Test programs Public Service Electric and Gas Co., New Jersey's largest utility, is testing a three-kilowatt system in the Essex County town of Maplewood.

"This is pretty indicative of the state-of-the-art system they could install today," says Harry Roman, a 30-year PSE&G veteran, adding that all New Jersey utilities are under state mandate to introduce forms of renewable energy like solar into their systems.

PSE&G is not the only metropolitan-area energy company with a solar power initiative. The Long Island Power Authority chose 30 homes from a lottery pool of 5,000 for its Solar Pioneers pilot program.

Two 3-by-5-foot panels attached to each home generate 500 to 600 watts of electricity daily enough to run a small to medium-sized refrigerator, LIPA spokesman Michael Lowndes says.

"We anticipate that these installations should yield enough electricity to defray a customer's annual electrical bill \$100," he says.

Lowndes estimates each installation, which LIPA covered, would cost homeowners \$4,000 to \$5,000. However, a \$100 annual savings and an initial cost of at least \$4,000 means Long Island customers break-even point would be 20 years, after factoring in tax breaks and rebates.

Initial costs vs. energy savings Such a lengthy break-even period begs the question of whether such installations are worth it.

"If it's important to you in terms of clean energy, then yeah," says Lowndes. "We're very optimistic you've got to start somewhere."

However, one Morris County contractor says he is not ready to jump on the latest solar-powered bandwagon.

"Over the years, the market has shifted to where I

would now say 95 percent of our work is pool heating and the remaining 5 percent is domestic hot water," says Rich Bonte of Solar Living in Netcong. "Twenty years ago, it was the opposite. People didn't care what the installation cost was. They realized we were conserving energy. The country was in that mode."

Bonte, formerly of River Edge, installs systems in New Jersey, New York, Pennsylvania, and Connecticut, and says the turning point came in 1985, when government tax credits dried up.

Today, he says, "People are looking for comfort. They're not looking for conservation . . . and I'm still very pro-conservation.

Potential customers say, "We have hot water already; how does this help us?" "

Systems that heat water for domestic use pay off more quickly than photovoltaic systems.

Installing a system to heat water costs \$3,500 to \$4,000, estimates Bonte, who has been in the business since 1977. Replacing a gas-fired heater can produce an annual savings of \$300, he says; replacing an electric heating system can generate a \$700-a-year savings.

"If it's gas, you're talking 12 to 13 years" to recover the initial cost, Bonte says. "If it's electric, maybe six years." Using solar energy

Paul Brozena of Kinnelon had panels installed in 1978, when energy costs were a major concern and he, his wife, Marion, and two children were living at home.

"I took advantage of the grant monies the state was offering. And it turned out to be an economical way of getting hot water for the house," he says. "When children get into a shower . . . they lose track of time 20-minute showers are quite common." Brozena says his system requires very little maintenance and has reduced his oil deliveries from about six a year to two. However, he says, his children have now moved

out of the house and he uses hot water generated by his furnace during the colder months and burns wood for some of his heat.

Longtime Bergen County resident Hugh Stier also went with solar power, having panels installed at his expanded Cape Cod home in Oradell in 1979. The house was heated by gas and the idea was to cut down on it.

"I was going along with the general concern in the 1970s about energy," says Stier, 69, who now lives in Wallington. "I'm sure I probably saved some money." The installation of three panels to the roof above the garage cost about \$2,800. When the panels were removed 10 years later at a roofing contractor's insistence, Stier recalls, "The whole concern about energy was gone." Frank Colucci uses solar power to heat water for the in-ground pool at his home in Oakland.

"We wanted to get more of a season out of it, more swim time," he explains.

The panels are on the rear of the roof on his two-story colonial, negating any concerns about their appearance.

Future of newest technology

Experts agree it will take time for photovoltaics to take hold in the marketplace and pay off economically.

"In the early 1970s solar power cost \$70 a watt" for materials and installation, says Roman, a technology, development, and transfer consultant for PSE&G. "It's now down in the \$6 to \$8 range per watt, and it will reduce to the \$3 per watt range in the next decade or so" equal to \$3,000 a kilowatt.

"Right now, at \$6,000 to \$8,000 a kilowatt, it's pretty darn expensive."

The cost compares to less than \$1,000 per kilowatt for electricity from a utility, says Roman, whose

actual cost depends on the method of generation, time of year, and type of plant.

Lowndes, of LIPA, says that environmental awareness is a factor to some, while for others it's a financial concern.

He points to a Suffolk County man who had an array of panels installed, generating enough energy for his home and a surplus that he sells back to the utility.

Experts say that solar energy is like any other emerging technology: Improvements will increase efficiency and lower costs.

"This sort of thing has been bandied about in the past by other utilities. We've gotten to a point now where it's really become cost-efficient," says Lowndes. "If you have enough people pulling together, then everyone benefits." NJIT's Kastl also believes solar energy can be viable in the tri-state area.

"The Northeast has some of the highest conventional electricity costs in the country. So you would expect solar power to prove itself here earlier than it would elsewhere," says Kastl, who is also an architect and research director.

He says that regions closer to the equator and with few cloudy days such as the Southwest have a built-in advantage.

Despite solar power's sunny outlook, don't expect to see work crews taking down power lines any time soon.

"This is simply one of the innovative alternative energies that we are beginning to experiment with on a widespread basis that may have a feasible future," says Kastl. "I don't see that we're going to do away with the power grid in general for a very long time."

More information on solar energy is available online at:

www.ases.org (American Solar Energy Society, Boulder, Colo.; 303 443-3130).

www.solarnet.org (Solar Utilities Network).

www.fsec.ucf.edu (Florida Solar Energy Center).

Additional Web sites can be found by searching for the key words "solar energy." (SIDEBAR)

Getting a charge out of the sun

In the dark about how solar energy works? Experts offer a primer on three kinds of systems in use today:

Photovoltaics. Also known as solar cells, they sit in a glass-faced panel on rooftops. When exposed to sunlight, they generate electricity.

"That sunlight is collected and stored in batteries for uses in the house as required," explains Peter Kastl, director of housing and building technology at New Jersey Institute of Technology in Newark. "It goes through inverters that convert it from direct current to alternating current, which can be used by appliances and devices in the house.

"At that point, it's conventional 120-volt, alternating electricity."

What sits on top of the panel boxes is actually two pieces of glass separated by a thin film of silicon, explains Harry Roman of PSE&G.

Domestic hot water. Antifreeze is kept in a closed-pipe system that runs from a storage tank to rooftop. Circulated by a pump, the antifreeze is warmed by sunlight or by ambient hot air. Upon returning to the storage tank, the antifreeze goes through a coil at the bottom of the tank and warms up water stored above it.

The heated water is then circulated in the home.

"It's for the most part pretty much maintenance-free," says Paul Brozena, who's had such a system at his

Kinnelon home for more than 20 years.

He says a backup system is needed during the colder months and on cool, cloudy days.

"I think you have to keep in mind you can't depend on it 365 days a year," Brozena says. You're more apt to benefit from it from mid to late spring to early to mid fall."

Pool heating. Works in much the same way as the domestic hot water system does, but without the antifreeze. Pool water is pumped to the rooftop panel, where it warms up. It then returns to the pool and is circulated.

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