

Plugging Into The Sun

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By Gregory Dicum

WILLIAM LEININGER is not your typical environmental zealot. A Navy commander who works as a doctor at the Naval Medical Center San Diego, he is a Republican and lives in one of California's most conservative counties, in a development of neat lawns and Spanish-style houses. His 2,400-square-foot, single-level house "the usual Southern California design," he said recently is barely distinguishable from its neighbors, apart from one detail: the red-tile roof is crammed with solar panels.

Dr. Leininger, 42, is one of thousands of Californians, many of them unlikely converts to the cause of alternative energy, who have installed solar power systems in their homes in just the last year. Spurred by recent legislation that provides financial incentives and by rising energy costs and, perhaps, by a lingering distrust of power companies in the aftermath of the California electricity crisis at the start of the decade homeowners across the state have come to see solar power as a way to conserve money as well as natural resources. Architects in California are routinely designing solar systems into custom homes, and developers are offering solar systems and solar-ready wiring in new spec houses and subdivisions.

Solar power is also emerging as a kind of status symbol, a glamorous mark of personal responsibility. Celebrities, including Leonardo DiCaprio, Alicia Silverstone, Carlos Santana and Tom Seaver, have installed solar systems. (Edward Norton runs a campaign in Los Angeles, encouraging his fellow celebrities to install solar panels on their homes and to make donations for systems in low-income housing.)

The vogue began in earnest a year ago, when the state legislature approved the California Solar Initiative, one of the most ambitious solar programs in the world. The legislation took effect at the start of this month but was preceded by a stopgap measure with similar terms that ran throughout 2006, offering homeowners a rebate on top of the federal tax credit of up to \$2,000 that has been available nationwide since 2006.

The theory was that supplanting the year-to-year incentive programs in place since 1998 with the long-term certainty offered by the initiative's 10-year, \$3.2 billion program of rebates (one-third of which would likely go to homeowners) would stimulate the development of a robust solar sector which could then be weaned from subsidies as its growing scale brought down prices.

If it works as planned, aid J. P. Ross, the policy director for Vote Solar, an organization that advocates for large state-level solar projects, the initiative will stimulate the installation of 3,000 megawatts of solar



Noah Berger for The New York Times

URBAN ENERGY Nicky Gonzalez Yuen's Berkeley duplex is one of many new solar houses in California cities.



Jack Smith for The New York Times

CALIFORNIA DREAM William and Suzann Leininger no longer have to worry about paying the power company.

electrical generating capacity in the state over the next decade. That would be an increase by a factor of more than 20, Mr. Ross said, equivalent to 30 small natural-gas-fired power plants.

Given the enthusiasm homeowners have shown for the initiative, filing nearly twice as many plans for solar systems with the California State Energy Commission in 2006 than in previous years, this goal may not be far-fetched.

Other states are considering the future of their solar programs (several states in the Northeast and the Southwest have less ambitious ones in place, including New York, New Jersey and Connecticut), and they are closely watching California's.

As the rebate program has made it less expensive to install a home solar system and as banks, which consider a solar system to be an improvement that increases a house's value, have made financing readily available the solar industry has grown. There are now 434 companies registered to install solar systems by the state energy commission, which together installed just under 50 megawatts of solar electric generating capacity in 2006, the most in a single year. (California's total capacity by October was 180 megawatts, enough energy to power about 135,000 homes. At the end of 2005 the nationwide solar photovoltaic capacity was 425 megawatts.)

While much of the total came from industrial and utility installations, more than 7,000 homeowners filed plans with the state energy commission in 2006, up from about 4,000 in each of the previous two years.

The companies are responding not only to an increase in demand, but also to a change in the type of consumers interested in going solar. Unlike the do-it-

yourself tinkers who once made up much of the home photovoltaic market, the people fueling the current growth spurt are interested in hands-off user friendliness.

"I more or less set it up and then I forgot about it," said Nicky Gonzalez Yuen, an instructor in political science at De Anza College in Cupertino, who hired a company called NextEnergy to install the modest three-kilowatt system in his 100-year-old Berkeley duplex. "I'm a really busy person, and I didn't need to know that level of information."

Companies like NextEnergy provide homeowners with a complete package that includes system design, permit applications, rebate processing,



Photographs by Noah Berger for The New York Times

EMPOWERED

Robert Felton, in front of the expanse of solar panels he installed near his large house.

installation, maintenance and warranty. "It was a seamless, painless process," said Mr. Yuen, whose system cost \$16,000 after the California rebate and the federal tax credit, which together saved him \$10,000. It was "comparable to having a sprinkler system put in," he said.

Mr. Yuen, 47, was the first on his block to install a solar system: "In my circle I'm the eco-nut," he said. But, he said, less than a year later they are quite common in his neighborhood. "A lot of people are really paying attention and beginning to think about the whole environmental cycle," he added.

But even as these solar adopters re-evaluate their relationship to the power grid, virtually all of them remain connected to it, which is contrary to the go-it-alone image of the early solar pioneers. Though the connection means a house will lose power in a blackout, most home users find the ease of operation makes up for the loss of independence.

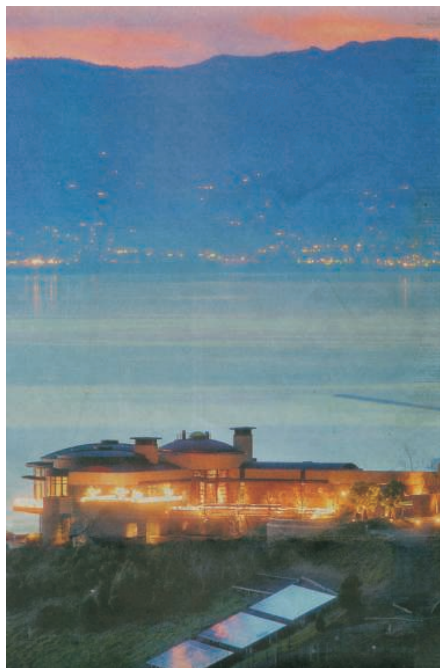
"All I see is an e-mail from the system once a month," said Robert Fel-ton, chief executive of TenFold, a software company, of the report of how much power his mansion in the Oakland hills is using and producing.

As recently as 10 years ago it was unheard of and, in fact, illegal for solar-powered houses in California to connect to the grid; now power companies are legally required to credit their customers for the excess power they produce.

The grid, in effect, serves to store power, replacing the bank of batteries that is a component of off-grid systems. At the end of the year, credits for solar power added to the grid are applied against charges for power taken from it, helping homeowners "zero out" their electricity bills. According to Borrego Solar Systems, the company that installed the long rows of solar panels on a hill next to Mr. Felton's house, two-thirds of its customers manage to do so.

Excess credits are lost at the end of the year, so homeowners, at least for now, cannot make a profit from their solar systems. Even so, the savings can be substantial: in 2005 Mr. Felton paid Pacific Gas and Electric about \$2,500 a month for electricity. ("I have a whole bunch of fountains and water features and stuff like that," he said.) In California residential electricity rates are tiered, and large users like Mr. Felton pay rates about three times higher than more modest consumers, making solar power even more attractive.

While the average home solar system is about five kilowatts, Mr. Fel-ton's is 45 kilowatts, and he



Chasing Solar Power in the Northeast

HOME solar systems in the Northeast can produce up to 90 percent of the electricity generated by those in California, said Michael Hall, chief marketing officer for Borrego Solar Systems, a company in California. It is not surprising, then, that some California installers are expanding nationally. They include PowerLight and Akeena Solar, which opened offices in New Jersey in the last two years.

The New York State Energy Research and Development Authority's Web site, power.naturally.org, explains the state's incentive program, which has been in place since 2002. It covers 40 percent to 70 percent of the cost of a home system, depending on its size and other factors. State-approved installers are listed at the site as well.

New Jersey has been offering rebates to

homeowners for photovoltaic systems since 2001, and it is now the second-largest solar market in the country. The state offers rebates up to \$3.80 per watt for home systems. While this is less than New York's rate, New Jersey makes it possible for system owners to sell renewable energy credits and earn continuing revenues, unlike New York and most other states. Details and contact information for dozens of installers are at the New Jersey Clean Energy Program's Web site, njcep.com.

Connecticut's rebate program pays up to \$25,000 per solar photovoltaic installation, depending on the components used and how they are configured. Information is at ctinnovations.com/funding/ccef/solar_rebates.php.

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Nicky Gonzalez Yuen and his wife, Jude, in their duplex, which has a much smaller system but still supplies all the electricity they need.

seldom sees an electric bill. Borrego Solar estimated the system could save Mr. Felton almost \$2 million over 30 years far more than the \$255,000 the system cost him after a \$134,000 rebate.

Mr. Felton, 67, said that a solar system did not make sense when he built his house in 2000, but that the rebate, as well as rising electricity prices, persuaded him to install the system last year. His pragmatic concerns were also informed by broader issues. "I'm not a hippie greenie," he said, pointing out that with a background in nuclear engineering, he strongly supports nuclear power. "But solar is certainly a way to get off foreign oil."

As a member of the military who has been deployed to the Persian Gulf three times, Dr. Leininger has been affected by the nation's foreign oil habits more than most. "The need for stable oil supplies is the big reason that we spend so much time in the Persian Gulf," he said. "Decreasing our national energy

consumption is in my self-interest."

His neighbors in the San Diego suburb of Escondido, most of them politically conservative, have responded well to the solar panels of the eight-kilowatt system that he and his wife, Suzann, a cartographer, installed last year on their roof. The neighborhood association, which was required to approve the plan by California law, did so happily, he said. Lately, the Leiningers have noticed at least one other photovoltaic system in the immediate area and a number of solar heating systems for swimming pools. (Meanwhile, in Orange County, which is known for its political conservatism, about 250 solar installations were approved from January to November last year, more than twice the 2005 figure.)

The Leiningers, who paid Borrego Solar \$39,000 for their system after a \$24,000 rebate, figure their system will pay for itself in a dozen years assuming residential electricity rates do not increase, as they

have by 37 percent since 1998. Dr. Leininger estimated that his system had reduced his household carbon emissions by nearly 30 tons since it was installed in June, and that it was well on its way to zeroing out.

"It comes down to personal responsibility," he said. "If I can go electricity-neutral on my house, that's that much less coal we have to burn."

And much less money. "One of the most gratifying things is on a sunny day when the meter is spinning backward," Dr. Leininger said. "We have a guaranteed return on the system because we know we're not going to have an electric bill from now on." ■