

Solar Electricity Works for Texas

TEXAS STATE DOCUMENT
UNIVERSITY OF TEXAS PAN AMERICAN
EDINBURG, TEXAS 78539-2999



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

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HIGHLIGHTS

- ◆ **Photovoltaics offer a cost effective, reliable and flexible alternative in "off the grid" and small power applications**
- ◆ **Photovoltaic systems have no moving parts, consume no fuel, and create no pollution**
- ◆ **Photovoltaic systems are becoming cheaper and more common**

SUMMARY

From pocket calculators to sophisticated telecommunications equipment, photovoltaic (PV) systems offer a viable, cost effective power source. First developed for use in the space program, PV power now costs about 1/20 th of what it did when the first solar-powered satellites were launched into space. Declining costs and improving availability have led to widespread usage. PV technology is now used in some 400,000 homes around the globe. And PV usage is growing more than 10 times faster than world oil usage. Here in Texas,



School crossing signal powered reliably by PV
Photovoltaics are a perfect solution for situations calling for small amounts of power and high reliability.

SOURCE: GLENN S. BAIR

PV is being used for everything from powering school crosswalk warning signs to pumping water for livestock.

THE UBIQUITOUS PV

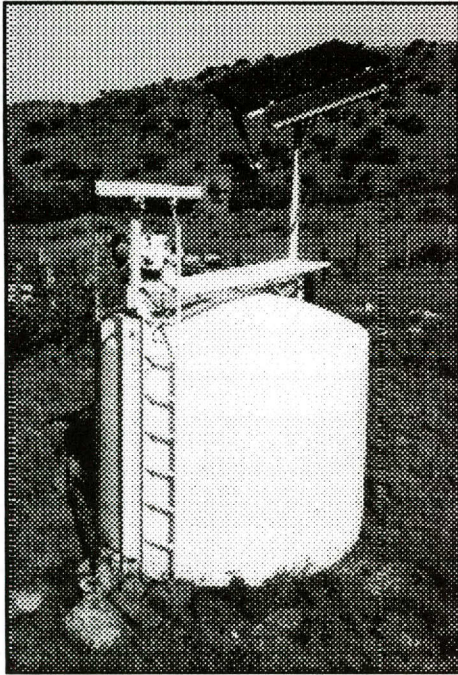
Watches, gate openers, railroad

switches, weather stations and navigational buoys are just a few of the items now being powered by photovoltaic cells. The economics of PV power, which cost about \$5 per Watt for modules and \$10 to \$15 per Watt for complete systems, are





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SOURCE: CENTRAL & SOUTH WEST SERVICES

Using the sun to water livestock

This PV system powers a small pump jack sitting atop the water storage tank. During sunny weather, when cattle are most thirsty, PV watering systems perform at their peak.

best suited to applications that are a mile or more away from existing power lines or that require small amounts of energy. PV's growing popularity stems from its unparalleled flexibility. For power needs ranging from milliwatts to megawatts, PV can handle the job anywhere on earth or beyond. Thanks to their relatively low system cost and high reliability, PV usage is

gaining acceptance for more high value applications every day.

COMMON PV APPLICATIONS

TELECOMMUNICATIONS

PV has become a common power source for a broad spectrum of telecommunications equipment including cellular phone repeater towers, radio-controlled valves used on oil and gas pipelines, emergency telephones, weather stations and remote data-logging equipment.

CONSUMER PRODUCTS

Solar-powered watches have suddenly become a hot item. Why? Their batteries are continually recharged by small PV cells, allowing the watches to run indefinitely without any maintenance. That advantage has led to the use of PV cells in a myriad of small electronic devices including calculators and toys. PV-powered chargers are also available to recharge batteries used in recreational vehicles, golf carts and boats.

EMERGENCY POWER

The portability and self-contained nature of PV has made it an increasingly popular source of emergency

power during disaster relief. After a storm when electric power is unavailable due to downed power lines, PV modules can provide the power needed for search and rescue operations and other critical activities.

SPACE APPLICATIONS

Photovoltaics continue to be a preferred power source for space exploration. PV cells are doing everything from powering orbiting telecommunications satellites to fueling the vehicle that recently explored the surface of Mars. And NASA continues to think of new ways to utilize PV. The space agency is now developing a high altitude surveillance craft that can stay aloft continuously thanks to the use of onboard PV cells.

BUILDING INTEGRATED SYSTEMS

When is an awning more than an awning? When it also doubles as a PV module. Solar shingles, skylights coated with PV material and other new building products can generate electricity while also serving as an important structural or design element of a home or office. Architects and building designers are gradually incorporating these new products into their latest designs.

WATER PUMPS

Powering water pumps up to about 2 horsepower in size is one of the most competitive areas for PV since it is simple, reliable and requires little maintenance. A well-designed and maintained PV water pumping system can last 20 years or more. PV pumper systems start at about \$1,500.

SOLAR LIGHTING

The City of Houston recently installed about 1,000 school zone flashing lights that are powered by PV. In addition, PV power is used for road maintenance warning signs, security lights and billboard lighting. Typical solar lighting systems

cost from \$600 to \$1,500.

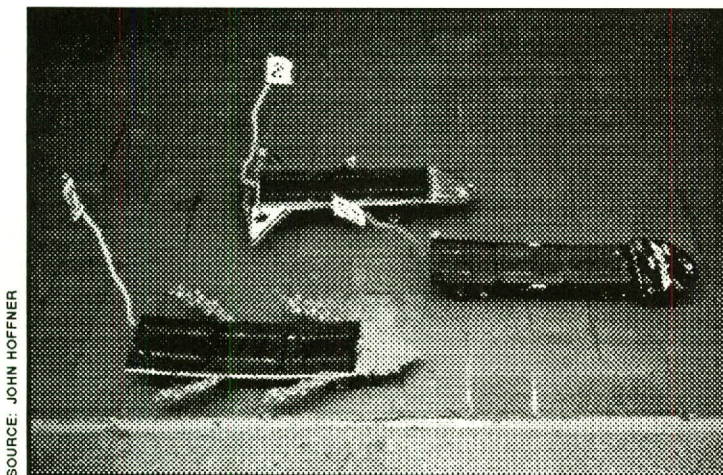
GATE OPENERS

Gate openers are an ideal candidate for PV power because they are often located far from available power lines. Some models are brawny enough to open gates 16 feet wide and weighing up to 250 pounds. These gate openers cost about \$700 and can utilize wireless remote control mechanisms or digital keypads, both of which offer convenience and security.

A ROOF FULL OF CELLS

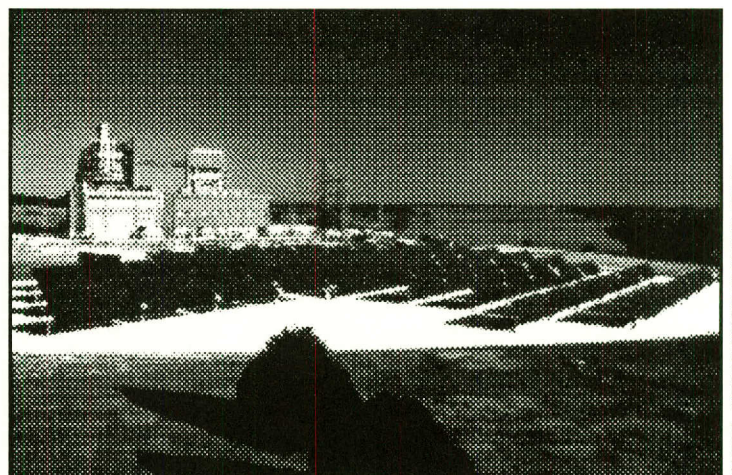
While there are a myriad of low-power applications suitable for PV

use, the biggest market for PV power may lie on residential rooftops. As always, the first step would be to make your home as energy efficient as possible. Your remaining electrical needs would then require a PV system with a capacity of about two kilowatts. With a price tag of \$15,000 to \$20,000, a complete residential PV system offers a green alternative that may appeal to some grid-connected consumers. Perhaps more importantly, the PV option allows homeowners greater flexibility in choosing a home site, since self-sufficient PV homes would no longer need to be located near existing power lines.



SOURCE: JOHN HOFFNER

Solar powered model cars *These model cars, each about 18 inches long, were built and raced by teams of elementary school students as a science activity to learn about energy, environment and teamwork.*



SOURCE: CITY OF AUSTIN ELECTRIC UTILITY

Solar power plant *Since 1986, this small 300 kW utility-owned power plant in Austin has used solar cells to convert sunlight directly into electricity. Some utilities are considering using customer rooftops rather than centralizing the PV installation in one location as done here.*

ORGANIZATIONS

American Solar Energy Society
2400 Central Ave., G-1
Boulder, CO 80301
303 / 443-3130

American Wind Energy Association
122 C Street, N.W.
Washington, D.C. 20001
(202) 383-2505
<http://www.econet.org/awea>

CADDET
Center for Renewable Energy
1617 Cole Blvd
Golden, CO 80401-3393
(303) 275-4373
<http://www.caddet.co.uk/>

National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393
<http://www.nrel.gov>

Texas Solar Energy Society
P. O. Box 1447
Austin, TX 78767-1447
512 / 326-3391
e-mail: info@txses.org
<http://www.txses.org>

Texas Renewable Energy Industries Association
P. O. Box 16469
Austin, TX 78761
512 / 345-5446

RESOURCES

TEXAS RENEWABLE ENERGY EDUCATION CAMPAIGN

Texas is in the midst of a major campaign to develop thought-provoking educational materials on renewable energy. The campaign includes: (1) the first-class video, "The Infinite Power of Texas," (2) 20 fact sheets for students and adults, and (3) a powerful World Wide Web site on the Internet. Begin your search for Texas-specific information on renewable energy at:

<http://www.InfinitePower.com>

INTERNET SITES:

<http://www.InfinitePower.com/factsheets/fs12.html>

Center for Renewable Energy and Sustainable Technology (CREST)
A comprehensive educational resource for renewables. A good place to start your search.
<http://solstice.crest.org>

Department of Energy. Web pages run by the Department of Energy on everything from cooling your home naturally to selecting a new water heater.
www.eren.doe.gov/erec/factsheets/factsheets.html

Florida Solar Energy Center. Information on photovoltaics, batteries, alternative buildings systems, solar heaters. The center is developing a test house which relies exclusively on PV power. www.fsec.ucf.edu

El Paso Solar Energy Association. Lots of good information. www.epsea.org

BOOK:

Texas Renewable Energy Resource Assessment: Survey, Overviews, and Recommendations.
Virtus Energy Research Associates, 1995. ISBN 0-9645526-0-4. Detailed summary of each renewable energy resource in Texas. (source: SECO, 512-463-1889)

POSTER:

Our Energy Sources Are Outstanding in the Field. (source: SECO, 512-463-1889)
(web version: www.infinitepower.com/poster1.html)



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State Energy Conservation Office

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