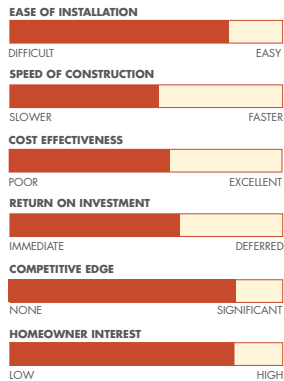


Harnessing the Sun: *Passive and Active Solar Systems Offer Growing Niche Market*




Builder's Experience



Challenges: Variable state laws on net metering; Variable state incentives for consumers; A limited market.

Would he do it again? Yes

PATH Attributes:

-  Energy Efficiency
-  Quality and Durability
-  Safety and Disaster Mitigation

Builder Tips: "Do your homework. And put the money into making the house efficient. You can't solar heat a drafty home. Focus on a holistic approach to the house, as opposed to doing things the old way, slapping PV's on, and saying, 'now I have an energy-efficient house.'"

Builder:

Orlo Stitt
Stitt Energy Systems, Inc. (SESI)
Rogers, Arkansas

Builder Type:

Small Custom Builder

The Technology:

Passive Solar Design; Solar Thermal and Photovoltaic Energy

The Project:

The builder's 3,300 square-foot home in Rogers, Arkansas, won the EnergyValue Housing Award in 1999 on the strength of its energy-efficient features, solar water heater and passive solar design. Eight years later, the enactment of new state legislation paved the way for Stitt to add the three kWh solar system that was always part of the plan.

"Solar always pays a tax-free dividend; it doesn't go down like the stock market."

— Orlo Stitt

When the Stitts' home won the EnergyValue Housing Award, it was a model of sound passive solar design. The home was also "photovoltaic ready"—as in, ready and waiting. With the utility at that time unwilling to budge on net metering, Stitt was unable to integrate an active solar system on the grid until January 2006, when Arkansas passed interconnection legislation. Now his meter sometimes runs backwards, the way he had always hoped it would. And he's selling solar every chance he gets.

STITT'S STORY

"My house has been a research house for the last eight years. I'm working on a progressive plan to minimize utility bills," Stitt says.

"For the last seven years, up until just recently, it has operated as a very energy-efficient, passive solar home. The house has a very tight ICF structure, with just .07 natural air changes per hour. Our utility bills were



After securing the support trusses, the crew lays photovoltaic panels side by side in a predetermined section of the roof.

averaging just \$65 per month for 3,295 square feet—two and a half times less than other homes around here."

PASSIVE SOLAR DESIGN

"We build for passive solar design every chance we get. It makes a house unique. And passive solar design along with other energy efficiency measures can reduce energy costs very significantly."

"Passive solar makes a lot of sense. It's so affordable for the customer. It is cost effective, and it makes you more in touch with the weather and the great outdoors. I always point out, 'houses have four sides and therefore face four directions.' The buyer needs to think about where the sun is, how it can be used in winter, and how to keep it out in summer. Otherwise, it's like putting your



Founded in 1978, Stitt Energy Systems specializes in the design of high quality, energy-efficient custom homes. Providing a variety of service options—from energy-only materials and services, to construction management services or complete home construction—SESI is active in 15 states. Its chief markets are Arkansas, Missouri, Kansas and Oklahoma. Stitt's homes range from 1,200 square feet and up, and start at \$120,000.

Why he integrates solar systems:

"Offering PV puts us in the forefront of our market—and it squares with our mission to build energy-efficient and environmentally responsible homes."



One to go! The supplier shipped a new PV panel to replace one broken in transit. It arrived the next day.

RUNNING THE METER BACKWARDS

Federal PURPA regulations of 1978 guaranteed the right to interconnect a renewable energy-powered generator to a home to reduce its dependence on utility-supplied electricity. The law also requires utilities to purchase the customer's excess electricity production, usually below retail cost. Often the utility will set the PV-generated unit selling price equivalent to the electricity pool price, about one-third the domestic purchase rate. A growing number of utilities offer "net energy" billing options that allow small systems to run the meter backwards, so they get the full retail rate for excess production. Today, some form of net metering is offered in more than 35 states.

feet in the oven and head in the refrigerator and expecting you'll be comfortable."

"For a passive solar design, we use overhangs and low-e, argon-filled windows on all sides. The placement of the house on the property is planned to minimize utility bills year round. In the northern hemisphere, the sun is high overhead in summer, and in the winter it drops down to the south. We use faux roofs that create an eave over the windows to control the sun in the house, just like your eyebrows shade your eyes. Sometimes we extend a porch for the western sun."

"Of course, you want to consider beautiful views, too. It's an art to place a house; there's no right or wrong. In the house and site plans, we like to have lots of glass and orientation to the south. Even the landscape plan is a matter of where we need to put deciduous trees to let in winter sun or coniferous trees that will break the prevailing wind to the north or northwest."

GRIDLOCK

"When my house was built, Arkansas had not yet passed legislation requiring utilities to offer net metering options. Some folks would do 'guerilla solar' anyway—net metering without the approval or knowledge of the utility—but we wanted to do it officially and be able to tell our customers what we were doing."

"Years back, the state passed legislation that you could send power back to the grid, but there were holes in it. The utility could pay you 2 cents for your power, and charge you 9 cents for theirs."

"We were fortunate to have a champion in Bill Ball, who's at Stellar Sun in Little Rock and has been building systems for people off the grid most of his life. He and others took the argument to the state legislature and the Public Service Commission. The utility didn't want anyone feeding into their infrastructure—they were concerned about the safety of linemen making repairs during outages and the quality of the power—but eventually we got the legislation in place."

"My interconnection contract came in the mail not long ago, so the PV system is finally up and running. We're going to try to zero out every month. Even on overcast days, we get some power. On bright days, it does very well."

THE MARKET FOR SOLAR

"Offering PV systems puts us in the forefront. We get the mavens—people who want to research everything. They're not casual buyers. Our customers are people who define quality of life as something different from the 'McBig' house or the 'starter castle.' They want well-planned, efficient use of space and energy."

"The PV system costs about \$26,500 labor and materials, with the batteries and uninterruptible power supply (UPS). It's definitely a niche market, but it has the potential for much broader appeal."

SELLING SOLAR

"We sell the reliability of solar and the long-term benefits of holistic systems. The economic dividends of an energy-efficient home and solar system with battery back-up don't ever go down; the system always pays off. The higher energy prices go, the bigger the dividend. It is certainly a better investment than granite counter tops or a bass boat."



The complete PV array on the pavilion behind the house helps Stitt sell solar. "You've got to have something for people to see," he says.

"Some states and municipalities—New Jersey, Colorado, Texas, Nevada and California among them—have the payback down to seven years or less with the rebates and incentives they offer. I believe it's the start of a trend."

"We're selective about which customers we approach to sell PV's. It may be that they're in a remote area, with no power. Or they want to be independent. Many of them are realists about the fact that the price of energy is going up. Some may just like to play with it."

"We show them our house, now that it's complete. A lot of times, it just sells itself. You've got to have something for people to see. People aren't very good at imagining a PV system. They'll think it's going to be ugly on the roof. My goal is to integrate it so that it's not aesthetically unappealing."

THE SYSTEM AND INSTALLATION

"We use a Sharp PV array. Alpha Technologies is our supplier of the PV system. They have an integrated system, with their own inverter. It comes as a kit, so it allows us to offer the customer a suite of options."

"The PV's need to be considered during the design phase. It's a matter of taking what roof is available. You define an area and

then determine how many panels can go in there."

"The manufacturer helped in the specifications of the system and sent a representative to assist with the installation. Our crew put the panels up. We installed them with the help of an electrician, which the state and utility require. With some support from the supplier, the electrician wired it and checked for voltage, amperage and function.

"The panels were up in a day; the wiring took another full day and a bit of the next. We checked the system on the third day. It was probably a day longer than it should have been, because we were green. The only snag was that one of the panels was damaged by a forklift. The supplier Fed Exed a replacement panel, and it arrived the next day."

TRAINING AND PERSUASION

"The supplier sent a very capable person to help on the first house we did. There was a good instruction manual, too. It was on-the-job training for our crew and for me."

"When we provide energy systems only, we have to work with the builder to persuade him to do things our way—saving trees, for example. We'd never take out a tree for the sake of solar, but

ON THE GRID: HOW IT WORKS

An inverter makes the output of a PV system compatible with utility power. The output is then connected to the house on a dedicated breaker, just like a large appliance. When the solar system isn't putting out as much power as the house needs, the utility supplies additional electricity. When the system generates more power than the house needs, the excess flows to the utility. The utility acts as a big battery bank that recognizes the PV system as a negative load.

TECHNOLOGY HIGHLIGHTS

This project included the following PATH-profiled technologies:

- Energy Recovery Ventilator
- ICF Foundation
- Photovoltaic System:
 - 3 KWh, Sharp Solar Panels
 - 3.5 KWh Inverter, Alpha Technologies
 - GEL-Cell Batteries
- SIPs Construction
- Solar Water Heater
- Sprayed Foam Insulation

we might trim the lower branches of one if it was shading the house or the solar array. We mark the trees when the house is staked, and talk with the owners, the builder and excavators on site about how the trees function as a part of the whole to minimize utility bills."

"But you can run into resistance from subcontractors and others who have never done an energy-efficient home before, so you have to educate them on the advantages right up front. HVAC contractors, for example: they'll think we need a bigger air conditioning system than we do. Friends and competitors might go right to the homeowners and tell them they're wasting their money. They can make an impression."

"Then there are the building and trade inspectors. Most of them need to be advised of the differences regarding PV's and solar thermal systems. For the most part, if it's done right and they have the knowledge and assurance they need, it's fine. They just want to know it meets UL and national electric codes."

LEAD TIME...

"We waited about two months for the panels, which worked fine with our work schedule. There is some shortage of

panels, though, because of world demand. Supposedly the industry is working very hard to relieve that shortage."

...AND LEADERS

"The challenges with solar and energy efficiency are not technical. We have the technology right now to save more than 50 percent of what we spend on home energy. We just need strong leadership. Many places promote and encourage solar. Some utility companies see it as a way of postponing new power plants. Distributed generation is more efficient, cleaner—and it will bring our energy dollars home to America."

"I just read an article in the March 2006 issue of *Solar Today* that challenges us to imagine life in 2106, what it would be like if green renewables proliferated. The environment would be better. The air would be cleaner. Health care costs would be down. It was a real positive, lifting article, a 'just do it' message. I am confident that it's going to happen."

The Partnership for Advancing Technology in Housing (PATH) brings together builders, manufacturers, researchers, government agencies, and other members of the housing industry. PATH partners work to improve the quality and affordability of new and existing homes. The program is administered by the U.S. Department of Housing and Urban Development's Office of Policy Development and Research.

To learn more about PATH, visit www.pathnet.org.
To learn more about PATH-profiled technologies, visit www.toolbase.org/techinv.



The opinions expressed in this document represent those of the builder and do not necessarily reflect the views of PATH.



Stitt hopes to "zero out" his energy bill every month with his combination of energy-efficient technologies and passive and active solar systems.