



Solar Industry™

Hybrid Photovoltaic/Thermal Systems Catching The Industry's Attention

Options are emerging to capture more of what the sun has to offer.

■ Charles W. Thurston

Industrial, commercial and residential customers seeking to harness more solar energy than that provided by conventional solar systems are creating a new level of demand for hybrid photovoltaic/thermal (PV/T) systems within the green-building boom.

Because thermal components of hybrid systems can double the amount of energy captured by photovoltaic-only systems, hybrids address more customer energy needs, cut conventional energy costs more broadly and can be amortized more quickly than conventional systems, industry players suggest.

Within the variety of specialized hybrids now available in the North American markets, some - such as Conservall Engineering's roof-mounted SolarDuct - perform dual functions (air pre-heating plus electricity, etc.) very well. Others, like Menova Energy's Power-Spar concentrator - designed for modular alterations and upgrades - can be modified for multiple functions without major reconstruction.



Products from Conservall Engineering have been incorporated into green buildings at Olympics sites in Beijing. Photo courtesy of Conservall Engineering.

However, there may be more questions about the overall cost and efficiency of hybrid systems than there are proven solutions.

"A limitation to the adoption of hybrid PV/T systems is that different market segments tend to be geographic/climate site-specific," says Steven Strong, president of Harvard, Mass.-based Solar Design Associates.

"And many of these hybrid designs are not workable for a house or a small commercial building for purposes like space heating," he adds. "So, you really have to look below the initial conceptual sales appeal, run the numbers and scratch your head."

Programs foster commercialization

To help answer such questions, governments and other institutions have engaged in a host of hybrid PV/T studies and programs over the past few years.

"Apart from research in Canada and the United States, a lot of people are spending R&D dollars looking at PV/T hybrid systems, including the Japanese, the Danes and the European Union," says Strong.

One three-year effort to bring hybrid technology to commercialization was organized in 2004 by the International Energy Agency, which has 27 country members, through

See Hybrid Solar, PAGE 8 ▶

WAFER PROCESSING

Automation, New Wires For Wafering

To create thinner, cleaner wafers, manufacturers may begin to move away from traditional slurry techniques.

■ Jessica Lillian

While essentially a basic slicing process, the procedures used to separate silicon ingots into a series of acceptable wafers for use in solar cells demand a formidable combination of extreme precision, appropriate speed, and cost-effective usage of materials and equipment.

According to some wafering professionals, the key to slicing success is to focus on loading capacity at the cutting tables - particularly when consumable materials such as slurry are used. Meyer Burger, like many saw manufacturers, feeds a suspension of glycol and silicon carbide into its systems to create an abrasive effect.

"The philosophy of Meyer Burger is that we try to have smaller ingots and smaller bricks for each cutting cycle," explains Werner Buchholz, head

See Wafer Processing, PAGE 12 ▶

3 ■ NEW & NOTEWORTHY

After years of heady growth in the PV market led largely by crystalline silicon, thin-film technology has reached a critical mass and is poised to start taking significant market share from incumbent technology.

27 ■ POLICY WATCH

Just weeks after issuing a moratorium on new solar projects located on public land, the Bureau of Land Management has reversed its decision and will continue accepting applications for potential solar development on the acreage it oversees.

30 ■ MANUFACTURING INNOVATION

Solar manufacturers and equipment companies alike are aware that progress must be made and roadblocks hurdled to catapult solar to its potential. Today, a number of issues related to markets and production are being met head-on by various industry participants.

its Solar Heating & Cooling (SHC) program.

In the U.S. market, the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory, for example, has been fostering hybrid systems under the Zero Energy Goals portion of its Building Technologies Program since 2004, according to Tim Merrigan, the project manager.

'A lot of people are spending R&D dollars looking at PV/T hybrid systems.'

After working through a series of program hurdles, Berkeley, Calif.-based PVT Solar Inc. now has seven DOE-reviewed hybrid systems in different locations in the U.S. to help demonstrate how climatic variations affect the system performance.

PVT Solar's design is a PV/ther-

mal air-based system that utilizes a heat exchanger to provide space-based heating, water heating and ventilation. The system - which is being tested for night-cooling properties - substantially increases the energy output of a PV array, says Gordon Handelsman, the company's president.

Customers can select the PV panels to be used in the system, and the thermal component would typically raise the cost about 25% over a conventional PV system, he adds. PVT Solar's product will be available nationally in 2009, according to company.

Early success

Toronto-based Conservall Engineering, with offices in Buffalo, N.Y., and Paris, invented the SolarWall air heating technology. In June, the company began to use the same technology in use in its wall panels on rooftops as a thermal rack system for photovoltaic panels in a hybrid array: the SolarDuct PV/T.

Although the current design is for air heating, night-cooling cycles are being tested, says Victoria Hollick,



A hybrid photovoltaic/thermal solar installation in Reno, Nev. Photo courtesy of PVT Solar.

the vice president of operations for the company.

The value proposition of the hybrid PV/T technology, she says, is meaningful.

"The PV component generates 100 watts per square meter, and the thermal side adds 200, so the total

output is 300 watts," Hollick notes. "While the cost of PV is approximately C\$6 a watt, the SolarWall panels are only C\$0.75 a watt, so the PV/T hybrid has a cost of about C\$2.50."

The design will adapt to the customer's choice of PV panel manufacturer, she notes.

Adoption of the SolarDuct or other thermal air systems in Canada is encouraged by a government mandate for circulating fresh air in buildings. And as far afield as China, the Olympics committee already has adopted use of the hybrid SolarDuct technology on some of its green buildings.

Conservall, Hollick says, is moving steadily toward a significant global footprint, having installed some 1,500 projects in 30 countries. Partnerships are helping drive this kind of growth, she adds.

"While we work with other system integrators, we are starting to do work with Conergy - one of biggest integrators in Germany - for projects in Canada," Hollick notes.

Thermal liquid

Another hybrid PV/T manufacturer is Menova Energy, which has produced Power-Spar systems since 2004. The two-axis systems, which come in 20-foot and 40-foot arrays, consist of mirrors that direct light onto overhead PV cells, backed by a heat-transfer propylene glycol loop. Thermal energy is transferred via heat exchangers to water-filled tanks for various heating functions.

(Advertisement removed)