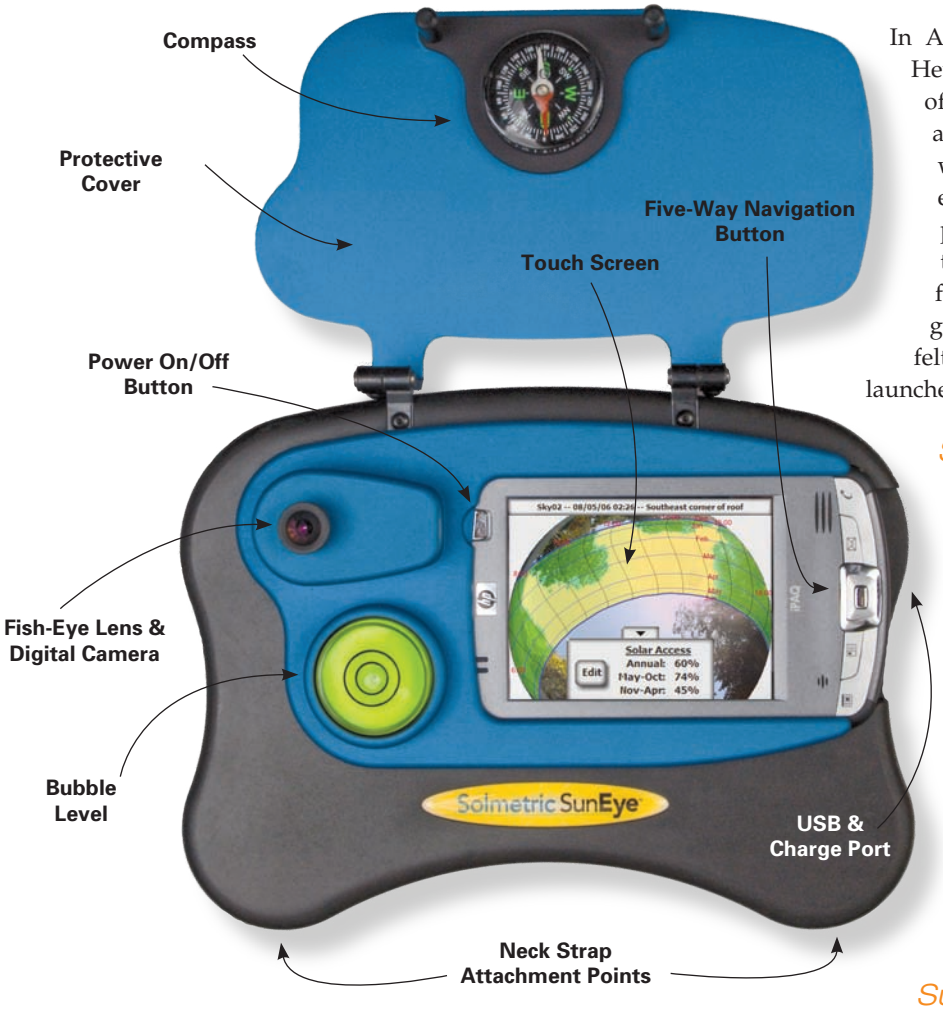
Solmetric SunEye

Solar Site Evaluation Tool

by Joe Schwartz



In August 2006, I heard from a friend at Hewlett-Packard that a former co-worker of hers had designed a new solar shading analysis tool that I should check out. Two weeks later at the SolFest renewable energy fair, Willard MacDonald, president of Solmetric, walked up to the *Home Power* booth with the tool my friend had mentioned. After a 15-minute guided tour of Solmetric's SunEye, it felt like solar site analysis had just been launched into the twenty-first century.

Solar Site Analysis

Home Power regularly stresses the importance of accurate solar site assessment. PV generation will be crippled if the array is installed in a location with excessive shading. Shading also affects the productivity of solar hot water collectors, although to a lesser degree than for PV modules. And shading analysis is important when designing passive solar buildings—it helps determine optimal building orientation, window locations, or trees that might need to be removed (or planted) to improve or limit solar access for particular sides of a structure.

SunEye Overview

The Solmetric SunEye is a handheld solar access and shade analysis tool. It integrates a Hewlett-Packard iPAQ PDA, used as the processor and user interface, with a digital camera, compass, and bubble level. Solmetric has refitted the iPAQ with custom software. The touch-screen interface provides easy navigation and operation with the touch of a finger. With a suggested retail price of $1,355, the SunEye is designed and built for PV, solar thermal, and passive solar building professionals (and is compliant with California's incentive programs).

Setup

The initial SunEye setup takes just a few minutes—complete the guided touch-screen calibration, set the date and time, and the unit is good to go. The SunEye Desktop Companion software,

provided on CD-ROM, enables you to export collected site data to a Windows-based computer for further analysis, report generation, and archiving. Free connectivity software can be downloaded to allow the SunEye to interface with your PC, and SunEye software updates are made available on Solmetric's Web site. Mac operating systems are not supported.

Surveying a Site

Once you're ready to perform a solar site survey, power up the SunEye, create a new session, and select the city and state nearest to the site location. Alternatively, latitude, longitude, and magnetic declination can be entered manually. The array orientation (azimuth) and tilt angle default to true south and latitude respectively. But both of these variables can be changed in the Skyline Properties menu. This feature also allows you to determine solar access for arrays oriented east or west of true south, as well as at different tilt angles.

To capture a skyline graphic of the site, fully open the SunEye cover and select "Skyline" from the Display menu. Orient the compass toward magnetic south (declination is automatically calculated based on the selected location), and use the bubble level to level the tool. Then, simply touch the "Snap" icon to capture the image. Holding the curved edge of the SunEye firmly against your body will help you keep the tool steady.

The SunEye can store skylines and data for more than 50 site readings before uploading to your computer for archiving. The captured skyline is automatically saved, and an annual solar access percentage is instantly generated, along with separate percentages for May to October, and November to April. Changing to the "Monthly Solar Access" view generates a month-by-month bar graph of solar access percentages.

One great feature of the SunEye is its option to average multiple skylines from a single survey session. This is useful when surveying the entire area being considered for a large PV array. For example, a skyline from each corner of the potential array site can be captured to calculate the average solar access. This approach also helps determine daily shading patterns on various segments of the proposed array to plan the optimal configuration and layout of individual PV series strings.

Solmetric SunEye Details

MSRP: $1,355

Warranty: One year

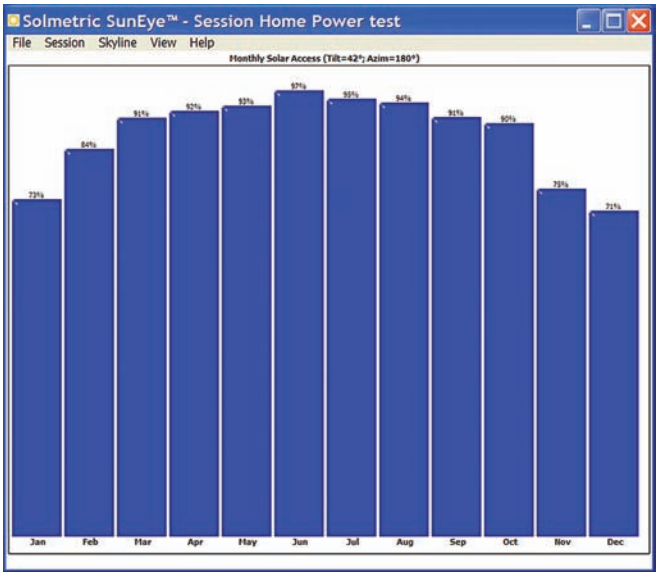
Computer System Minimum Requirements: Windows Vista, Windows XP, or Windows 2000; 700 MHz processor, 256 MB RAM, 20 MB hard drive space; and Internet Explorer

Image Editing & Reports

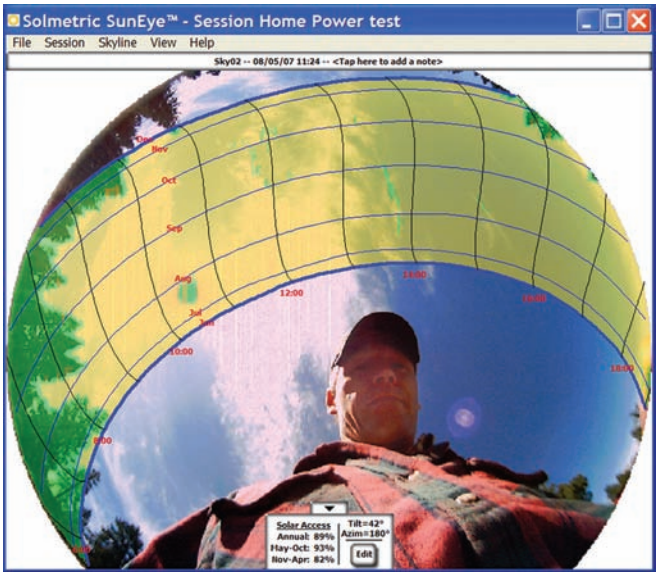
Both the SunEye and the Desktop Companion include skyline image editing software to fine-tune any shading patterns that may not have been interpolated accurately by the SunEye software. The image-editing tool also lets you "remove" objects, such as trees that are creating unwanted shade in a skyline/sun path image. At the touch of a finger, you can remove a tree that's causing excessive shading, and automatically recalculate the solar access that would be available if the real obstruction were removed.

The SunEye Companion software generates a comprehensive report that includes sun-path images, monthly solar access bar graphs, and links to spreadsheet-compatible tables for a survey session. The tables include data for daily

SunEye's "Monthly Solar Access" display.



SunEye's sun-path display.



solar access, insolation, shading, and obstruction elevations for further analysis.

SunEye Battery Basics

The SunEye can be charged using the provided AC charger, from a computer via the USB cable, or using an optional DC car charger. The lithium-ion (Li-ion) battery in the iPAQ has an expected life of 400 to 500 full charge cycles. At a typical discharge of 50%, the manufacturer estimates a battery life of 800 to 1,000 cycles. The battery is not removable, so in the case of failure, the unit must be shipped to Solmetric for replacement. Solmetric policy keeps the typical battery replacement turnaround time to one day, plus shipping time. Loaner units are available if a battery replacement would result in unacceptable downtime for the user.

In good condition, a fully recharged SunEye battery will power the unit for about three hours of continuous use. The Li-ion battery has a fairly high self-discharge rate and will completely lose charge after about nine days if left unused without charging. Data will be held in memory in this case, but the touch-screen and date and time will need to be reset. If you're used to keeping cell phones, MP3 players, PDAs, and the like recharged and ready for use, adding the SunEye to your charging routine will be easy.

Solmetric recommends keeping the unit continuously connected and charging so it's ready to go when you are. I was curious about how much energy the SunEye would draw under a constant float charge. After 24 hours, the Kill A Watt power meter I used for testing didn't register a single kilowatt-hour (KWH). In float service, the SunEye draws between 0 and 1.2 watts. Over 24 hours, I estimate the unit would consume less than 20 watt-hours.

More to Come

Solmetric is developing a new version of their SunEye software package called SunEye Pro. This major software upgrade is expected to cost less than $200 and will be compatible with existing SunEye units. The upgrade will incorporate state-specific incentive program shading criteria. The SunEye Pro software will report the optimal array tilt and azimuth for a given site, and data output will be converted to KWH in addition to the percentage figures provided by the current SunEye software. One great advantage of the SunEye's software-based design is the ability to upgrade the unit as new features become available—this tool will just get better and better.

Access

Joe Schwartz (joe.schwartz@homepower.com), Home Power CEO and executive editor, holds a Renewable Energy Technician license in Oregon. His home and home office are powered exclusively by renewable energy.

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