



BIOMASS



SOLAR



WIND

Pole-mounted solar electric systems offer an excellent opportunity for businesses to display a commitment to renewable energy. Also called solar flags, these systems are economical because they tend to be small. Today, solar flags are seen outside business establishments, in parking lots and in city parks. Not only do solar flags generate electricity, they also promote clean energy technology in a highly visible way.

When most people think of solar panels, they think of roof-mounted systems. However, roof-mounted systems are often hidden from view, partially shaded by trees, or not facing the best direction to capture solar energy. Solar flags can be installed in highly visible locations and positioned optimally to capture sunlight. Installing a solar flag does not involve attaching anything to your building, and the occasional maintenance requirements will not include a trip to the roof. Also, unlike roof-mounted systems, pole-mounted solar flags do not need to be removed and reinstalled when the roof is replaced.



This 1.8 kW solar flag on a dual-axis tracker augments the educational mission of the Discovery World Museum in Milwaukee.

Pole-mounted systems come in three types:

- **Stationary systems** are the most common and the least expensive. They are usually oriented to receive the best average sunlight throughout the year. Stationary racks do not adjust the solar module's orientation either manually or mechanically to increase the system's electricity production.
- **Manually adjustable systems** are stationary systems where the tilt angle of the solar modules can be manually adjusted twice a year, at the equinox, to increase annual system production by about five percent per year.

FLAG ECONOMICS

Solar electric flags can offer great economics and a relatively low cost. They are available in different sizes and prices (see Table 1). Costs tend to be significantly lower for business owners who pay federal taxes. If your electric utility offers a solar buyback rate, your solar flag can pay for itself in less than ten years. What's more, some utilities offer additional incentives to nonprofit organizations and government agencies.

TO TRACK OR NOT TO TRACK?

To create a solar flag, modules can be mounted on a stationary frame or on a tracker that moves with the sun.

TABLE 1
ESTIMATED SPACE REQUIREMENTS, ENERGY PRODUCTION AND COSTS FOR TAX-PAYING AND NON-TAX-PAYING OWNERS.

SIZE	SOLAR MODULE AREA	ESTIMATED ENERGY PRODUCTION (STATIONARY SYSTEM)	ESTIMATED INSTALLED COST	ESTIMATED COST AFTER INCENTIVES	
				FOR TAX PAYERS ¹	FOR NONPROFITS ²
1 kW	90 sq. ft.	1,200 kWh/year	\$10,000	\$2,675	\$7,600
1.5 kW	135 sq. ft.	1,800 kWh/year	\$14,500	\$3,800	\$10,900
2 kW	180 sq. ft.	2,400 kWh/year	\$18,500	\$4,750	\$13,700

¹ Assuming a 35-percent federal tax rate and co-funding from the Focus on Energy Cash-Back Reward, the federal 30-percent tax credit, and federal five-year accelerated depreciation.
² Assuming co-funding only from the Focus on Energy Cash-Back Reward.

Contact Focus on EnergySM to learn about renewable energy options for your home, business or organization. Full program details, applications for awards and eligibility requirements are available from the Renewable Energy Information Center. Call 800.762.7077 or visit focusonenergy.com.



In addition to locating a solar electric system on the roof, Wisconsin Energy Conservation (WECC) of Madison, WI placed four 1.25 kW, non-tracking solar flags on its grounds. The flags are adjusted twice a year, increasing output by about five percent compared to a stationary system. These flags, located in the parking lot, are shown in their summer position.

■ **Dual-axis tracking systems** provide the optimal panel inclination throughout the day and year by following the sun's daily movement from east to west and its change in altitude through the seasons. Dual-axis trackers increase electricity production by about 30 percent compared to stationary systems.

Solar panels generate the most electricity when they are positioned to face the sun directly. Manually adjustable and dual-axis tracking systems gather a higher proportion of sunlight than stationary panels (see Table 2) because they move to follow the source.

SYSTEM SIZE	STATIONARY SYSTEM	MANUALLY ADJUSTABLE SYSTEM	DUAL-AXIS TRACKING SYSTEM
1 kW	1,200 kWh/year	1,260 kWh/year	1,560 kWh/year

If tracking systems produce more electricity than stationary pole-mounted racks, then why choose a stationary system? Two factors—maintenance and cost. Tracking systems have moving parts that require regular maintenance, and may occasionally need repair. They are also more expensive than stationary systems. The initial cost of a solar electric system on a dual-axis tracker might be 25 percent higher than a stationary pole-mounted rack. However, because a solar electric system on a tracking device generates more electricity than a comparably sized stationary rack, it may be possible to use fewer solar panels to generate the same amount of electricity.

Solar flags work well at sites where roof mounting is impractical, and they make a striking visual statement about your commitment to renewable energy. A pole-mounted system may also be the most



PHOTO: LEE HAUST

This 10.4 kW, nine-flag system is located at the Clarkson, Ontario Wastewater Treatment Plant. The flags are installed on stationary racks positioned at 45 degrees. These Solar Flair™ modules are manufactured by Lake Michigan Wind and Sun, a Sturgeon Bay, Wisconsin company.

economical option for installing solar electric panels at your business.

START WITH A SITE ASSESSMENT

To better understand the economics and suitability of a solar flag for your site, including information about your tax status and eligibility for special utility incentives, Focus on Energy strongly recommends a commercial solar site assessment. During this assessment, a certified assessor will visit your site to evaluate its suitability for a solar electric system and make recommendations for the best size and type of system to meet your needs. Contact Focus on Energy to schedule a solar site assessment—visit focusonenergy.com/siteassessments.

MORE INFORMATION

focusonenergy.com

Contact Focus on Energy to learn more about energy efficiency and renewable energy choices. Financial incentives are also available.

focusonenergy.com/re literature

Focus on Energy offers a variety of information, fact sheets and case studies to help you learn more about solar electric and other renewable energy systems. Here are a few facts sheets to start with:

- Assess Your Property's Renewable Energy Potential
- Grid-Connected Solar Electric Systems
- The Benefits and Costs of Large Commercial Solar Electric Systems

Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state's growing demand for electricity and natural gas. For more information, call 800.762.7077 or visit focusonenergy.com.

