Subject: WindSonic used with Solar Tracking Farms

Reference AN0036

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Introduction

Solar Farms are increasingly being installed worldwide to provide cost effective access to energy. For flat-panel photovoltaic systems, trackers are often used to minimize the angle of incidence between the incoming sunlight and the photovoltaic panel. This increases the amount of energy produced from a fixed amount of installed power generating capacity.

Installing Meteorological instrumentation to monitor environmental parameters such as solar radiation, wind loading, precipitation, temperature and humidity, provides solar park operators with essential data to identify performance related issues and maintenance factors affecting efficiency.

How Do Solar Trackers Work



Solar Trackers change their orientation throughout the day to follow the sun's path to maximize output.

In PV systems, trackers help minimize the angle of incidence between the incoming sun light and the panel, which increases the amount of energy the installation produces. Concentrated solar PVs have optics that directly accepts sunlight, so solar trackers must be angled correctly to collect energy. Single-axis solar trackers rotate on one axis moving back and forth in a single direction.

Different types of single-axis trackers include horizontal, vertical, tilted, and polar aligned, which offer various rotate options. Dual-axis trackers continually face the sun because they can move in different directions. Types include tip-tilt and azimuth-altitude. Because these

trackers follow the sun vertically and horizontally they help obtain maximum solar energy generation.

There are also several methods of driving solar trackers. Passive trackers move from a compressed gas fluid driven to one side or the other. Motors and gear trains direct active solar trackers by means of a controller that responds to the sun's direction. Finally, a chronological tracker counteracts the Earth's rotation by turning in the opposite direction.

Selecting a solar tracker depends on system size, electric tariffs, land constraints, government incentives, latitude and the weather. Utility-scale and large projects usually use horizontal single-axis solar trackers, while dual-axis trackers are mostly used in smaller residential applications and locations with high government Feed-In-Tariffs. Vertical-axis trackers are suitable for high latitudes because of their fixed or adjustable angles.

The main advantage of the use of solar trackers can increase electricity production by around a 33% compared with panels at a fixed angle. In any solar application, the conversion efficiency is improved when the modules are continually adjusted to the optimum angle as the sun traverses the sky. As improved efficiency means improved yield, use of trackers can make quite a difference to the income from a large plant.

There are, however, some disadvantages of solar trackers:

- Adding a solar tracking system means more equipment and moving parts that will require regular maintenance and repair or replacement.
- If the solar tracker system breaks down when the solar panels are at an extreme angle, the loss of production until the system is functional again can be substantial.
- A solar tracker is also more prone to be damaged in a storm than the actual panels.

Monitoring Requirement

Weather monitoring is important at Solar Tracking Farms for several reasons, not just related to monitoring the exact level of solar radiation. Another important part is reliable wind speed and direction measurements are essential. To avoid damage to the solar panels wind speed and direction is used to shutdown tracking operations when wind gusts exceed set limits.

NEXTracker - A Whole New Way To Track The Sun

The NEXTracker Self-Powered Tracker (SPT) brings self-contained motor power to each row, saving time and money. No more external power wiring. No more UPS backup systems. Safer and more reliable with higher performance. Trustworthy, Independent Balanced Rows

The NEXTrackerSPT leverages NEXTracker's mechanically balanced row design, which aligns the PV panels with the tracker's axis of rotation. This alignment greatly reduces torsional load, requiring less energy from the motor to track throughout the day, and freeing each row to track independently.

NEXTrackerSPT's independent rows eliminate external AC power source systems, wiring and associated trenching. Self-contained units on each row include a dedicated 30 W PV panel to provide power to the Self-Powered Controller (SPC), which drives the motor and hosts intelligent control electronics to position each tracker. NEXTrackerSPT's wireless power and communication from the SPC enable each row to be truly plug and play.

Independently powered rows eliminate parasitic utility draw for a higher net energy yield. Intelligent, autonomous rows optimize operation, cleaning and maintenance activities. The tracking system rapidly moves into safe stow positions — an entire array can be stowed in under two minutes.

The NEXTrackerSPT's autonomous rows enable maximum flexibility in system design, overcoming constraints presented by irregular site boundaries or obstructions. No east/west grading, fewer access roads, and better utilization of corner areas increase power capacity 10-20% per site while reducing construction time. The self-powered rows enable the system to be commissioned without grid power.

Installations



Gills' ultrasonic anemometer WindSonic is installed as part of the NEXTracker Solar Farms to provide reliable wind data from a robust, no maintenance package to the PV panel in a safe position during high wind events. Each Solar Farm can have several WindSonics installed depending on the size of the Solar Farm (MW) and the physical lay-out of the Solar Farm i.e. if a large square flat Solar Farm then less sensors are required compared to hillside/sloping sites.

Why Gill?

Gills range of 2-axis anemometers provide wind speed (WindObserver up to 90m/s) and direction (360°) measurements in robust, polycarbonate, aluminium or stainless steel housings giving high quality, reliable and maintenance free fit-and-forget installations. Having no moving parts with high, long-term accuracy they offer clear advantages over conventional cup-and-vane instruments, particularly in such exposed, salt laden environments.

** Photo and text courtesy of NEXTracker*