

Case study



Terrasmart's Flexible 1P Tracker Speeds Experimental Success

Forward-thinking utility pilots DG interconnection with innovative solar partners



Utilities across the country are managing intermittent renewable integration with varying levels of success — and with good reason. Meeting resource adequacy, reliability, and resilience is a complex business that requires flexibility and inventive solutions.

National Grid, which serves 20 million customers in New York, Rhode Island, and Massachusetts, is piloting an innovative program to increase distributed generation (DG) interconnections throughout its territory. Using renewables to better manage peak capacity constraints, National Grid and other utilities are testing how DG systems impact the grid at the substation level. Called Active Resource Integration (ARI), National Grid's program tests how much distributed solar substations can integrate without overheating the utility's expensive equipment — and while reducing overall risk.

This is where Terrasmart and its client Nexamp come in. As a major community solar project developer in the Northeast, Nexamp is moving the needle forward through its participation in the market-leading ARI experiment. Because National Grid must have the flexibility to curtail projects as needed to maintain system reliability, participating developers receive collaborative support from the utility. For Nexamp, this meant the opportunity to move their projects up in the interconnection queue while foregoing upfront engineering analyses, which can cost up to \$1 million.

Because National Grid’s program requires flexibility, it’s only right that the tracker on Nexamp’s first ARI project — Allis Hill — would be Terrasmart’s highly flexible 1P TerraTrak.

“We trust Terrasmart to design and build a sustainable, reliable, low maintenance tracker system. If we know we are going to lose potentially 2.5% in a year because of the ARI’s curtailment, we don’t wanna lose any additional money in repairs,” said Hugh Jones, project manager for Nexamp.



Allis Hill dives into ARI program project planning and execution

Located 30 minutes east of Syracuse in upstate New York, Nexamp’s Allis Hill project is a 6.4-MW system in the two-century-old village of Canastota. Half of the project’s output goes to a single large customer, while the other half serves the community solar system’s local subscribers. With snow, wind, and challenging soil conditions, Nexamp selected long-term partner Terrasmart to install its risk-mitigating ground screw foundations and supply the 1P tracker, while Phoenix Solar performed the mechanical and electrical installation.

Project Details

Project Size	6.4 MW
Location	Canastota, NY
North/South Slope	10%
East/West Slope	20%
Foundation Type	3,421 ground screws
Rack Type	TerraTrak 1P

Soil Type	Clay
Frost Depth	42"
Wind Loading	101 mph
Ground Snow Loading	60 psf
Wind and Corrosion Design Life	40 years



Terrasmart & Nexamp partnership

1 Ground screw foundations

As one of the **first to deploy ground screws in the U.S. solar market** more than a decade ago, Terrasmart has become renowned for its bankability in difficult terrain and weather. Developers have come to depend on the foundation's ability to mitigate the risks of frost heave and challenging soils as they contend with the Northeast's long winters and thaw/freeze cycles.

Terrasmart's **streamlined ground screw installation** was a critical success factor during Allis Hill's construction. Delivering an end-to-end approach, Terrasmart's highly-trained team uses its own survey equipment to precisely stake each point before pre-drilling and driving ground screws. Terrasmart developed its proprietary ground-screw installation equipment based on its installers' input from the field. The bespoke equipment navigates sites more efficiently and can be operated with fewer personnel versus competing alternatives, increasing productivity without sacrificing quality.

Because of Nexamp's excellent site preparation and Terrasmart's industry-leading efficiency, the installation team exceeded its 175 screws per day goal, securing 200 screws each day with pinpoint accuracy. With only three operators on the site at any time, this ultra-lean team executed a record one to two minutes for drilling and two minutes to install each screw.

The result — a job scope that called for 35 days was completed in just under three weeks. Condensing the schedule prevents costly overruns and also means the site can start generating returns for the operator and power to the grid sooner.

2

Legs and screw extensions

Deploying integrated systems, Terrasmart's custom screw extensions and legs are both designed to work seamlessly with its fixed racks and trackers. **Nexamp selected Terrasmart's 1P SAT for Allis Hill**, which required that the legs be set to a predetermined height. The screw extensions and A-frames are designed to have up to 36 inches of adjustability which means they can handle local undulations and variations in slope between the foundations.



Once the portion of the foundation installation was complete, Terrasmart passed the remaining work (installation of the screw extensions, legs, torque tube, rails, and modules) over to Phoenix Solar, while continuing to support the process as a technical advisor to Nexamp. Terrasmart designed, manufactured, and fulfilled all of the project's racking supply.

"In our industry where communication is sadly lacking, it's such a breath of fresh air to work with Ron Dawkins, project manager for Terrasmart," states Hugh. "Ron is incredibly detailed and proactive in his communication, even when it wasn't good news. That takes a special kind of person."



Why TerraTrak 1P at Allis Hill?

Leaning into its long-term partnership, Nexamp knew it could count on Terrasmart's new 1P tracker to deliver all that the TerraTrak 2P configuration offered — and more.

The streamlined one-portrait configuration shares 80% of its parts with the two-portrait system, which has been proven in more than 500 MWs of projects in some of the most challenging conditions and terrain. Like the 2P, 1P is foundation-agnostic and can be paired with adjustable legs, allowing maximum flexibility both above- and below-grade.

The most significant benefit for Nexamp, however, is the tracker's height and ease of installation. TerraTrak 1P's lower profile is key in a state like New York where systems above a certain height require more stringent permitting. This makes the system even more attractive, both visually and administratively.





As an added bonus, the lower height meant ladders were not required during the installation. According to the Bureau of Labor Statistics, ladder-related falls account for **5,000 injuries per year in construction** alone. For Nexamp, this was huge; the developer could use a leaner, faster crew, and accomplish a safer install. Two installers are required to use ladders on a site — one at the bottom to spot and the other up top to secure the system. Because Allis Hill was installed during the winter with only a six-hour daylight window, the project could be completed much faster without that doubling-up.

TerraTrak's streamlined cable management compounded the benefits. Aside from being able to wire the system from the ground, electricians didn't need drip loops and other cabling because the system's integrated cable channels run the wiring alongside the torque tube for a streamlined profile.

“

We were able to install 2,112 panels in one day and that's an incredible figure. The main contributing factor for this speed is TerraTrak's 1P low profile and accessibility from the ground. Our installers could handle a panel themselves, hang it on the system, bolt it and quickly move on. Not needing ladders increased safety and kept the team fully engaged in handling wires, bolts, racking and modules — all while reducing labor hours.”

— Kyle Moore, Assistant Project Manager for Nexamp



The importance of tracker software

With trackers, getting the system installed reliably and on budget is only half the picture. Maintaining and optimizing your tracker over the lifetime of the project is just as important to ensure you hit energy goals and minimize operational costs. With TerraTrak, not only do you have durable mechanics that overcome any terrain or weather, you also have integrated smart software that protects from weather and boosts energy production. In upstate New York, you have high snow loads and wind to consider. With TerraTrak's PeakYield™ technology, sites automatically stow when thresholds are crossed for wind, hail, or snow, ensuring you protect your assets.

In some cases, site topography plays a role when it comes to backtracking. Instead of assuming a flat site and that each tracker row shares the same elevation, like with typical backtracking, topography informed backtracking incorporates three-dimensional site conditions. With topography informed backtracking, it considers its neighboring tracker positions to avoid shade. This is ideal for sites like Allis Hill where the north/south slopes are 10% and east/west slopes are 20%. Depending on site conditions, deploying topography informed backtracking can increase production by up to 3%. After reviewing DNV analysis, Nexamp decided to deploy Terrasmart's topography informed backtracking algorithm on Allis Hill.

"DNV's technology review of TerraTrak provided valuable independent analysis of the system's tracking algorithms. For Nexamp, this report adds meaningful confidence in the technology's performance assumptions, helping strengthen our own independent assessments," said Stephen Petrarca, Associate Principal Project Engineer, Nexamp.

In addition to boosting energy and protecting from weather events, TerraTrak's PeakYield™ technology, provides remote, real-time access to your site and row level control to make O&M faster and easier.

The combination of an adaptable tracker and intelligent software, ensures Allis Hill can withstand the test of time.



TerraTrak 1P unique advantages



Contains costs with fewer foundations

TerraTrak 1P's stow approach reduces static and dynamic wind loads, resulting in fewer foundations per megawatt, less material, and a faster installation.



Streamlines installation with 30% fewer components

Innovative spherical bushings reduce assembly parts by 73% for a quicker and more efficient installation process. The spherical shape also allows for more tolerances and efficient torque tube alignment, making it easier to install.



Optimizes wire management

By routing the wiring along the torque tube, the 1P facilitates faster wire installation and saves on skilled labor while ensuring long-term safety and reliability.



Stabilized aerodynamics

With more than 700 hours of wind tunnel testing, 1P engineers collaborated with Canadian consulting firm RWDI to determine optimal balance of wing length, stiffness, and damping. This led to a variable stow angle approach that greatly reduces static and dynamic wind forces making TerraTrak 1P able to withstand the 101 mph winds in the region.



Ensuring climate-readiness with smart software

Terrasmart's performance-monitoring software PeakYield™ protects assets in difficult weather to boost production and minimize downtime. PeakYield integrates a weather station, network controllers, and one box per tracker row to provide real-time data. This integrated system maneuvers each tracker row to limit shading, maintain exposure, and maximize system value.



Launching our 1P tracker as the latest member of the TerraTrak family with Nexamp allows Terrasmart to help National Grid reliably meet its production goals. We are grateful for the long-standing partnership with Nexamp that provided the opportunity to debut the 1P in the Northeast.



To reach our team and learn more, [click here.](#)