



Designing solar trackers for harder sites and tighter economics

As utility-scale solar moves onto more complex terrain, tracker design is being judged by more than energy yield. Structural resilience, installation time, and civil works are becoming central to project economics.

For much of the utility-scale solar era, a tracker's main job was clear: follow the sun, limit self-shading and help the modules produce more energy. It still has to do all three. But on a difficult site, the way the structure is built and installed can matter just as much to the project.

Developers and EPC contractors are now working in desert basins, foothills and irregular sites that might once have been ruled out in favor of flatter land. Larger modules and higher-powered strings place more demands on the tracker, while tighter margins make earthworks, cabling, installation hours and long-term maintenance harder to overlook. The tracker has become part of the plant's civil and structural plan, not just its energy-yield calculation.

For Axial, that leads to practical questions. How far can a row extend without losing stability? How will it follow uneven ground and withstand the loads it encounters? How much work will crews need to install and commission it? The answers depend on the whole system and on the site where it will operate.

Longer rows and fewer drives

One way to reduce the amount of equipment onsite is to make tracker rows longer. Fewer rows can mean fewer drives, motors and control systems, as well as less cabling and fewer electrical connections. That can simplify commissioning and reduce the number of components that may need attention during the plant's operating life.

Length brings its own engineering problems, however. Transmission, dynamic behavior and load distribution change as a row grows. Extending a conventional design is not enough: the drive and safety strategy need to work with the complete structure.

Axial Titan uses rows of up to 160 meters that can carry up to four strings. Axial Twin takes another approach, connecting two rows through a shared motor and a single multi-drive line using homokinetic technology. Both arrangements aim to use fewer critical components while keeping the structure under control. On a large project, the number of motors, connections and installation steps can have more effect than a small improvement in one component. That benefit still has to be weighed against the loads a longer structure must carry and the work needed to assemble it.

Designing for the ground that is available

Longer rows are useful only if they suit the ground beneath them. Excessive grading adds cost, schedule risk and environmental disturbance before crews even start installing the trackers. A system that can follow natural contours may reduce cut and fill, limit exposed foundations and make more of a difficult site usable.

That requires the mechanical design and control strategy to work together. Axial uses terrain-adaptive technology and 3D backtracking to manage the different row positions and shading patterns created by uneven ground. On sloping ground,



neighboring rows may sit at different heights, so backtracking has to account for shading relationships that a flat-site layout would miss. The aim is to maintain tracking performance without reshaping more land than necessary.

SlopeSync gives layout teams another way to deal with complex slopes, uneven terrain and pile-driving tolerances. By accommodating those variations within the tracker geometry, it allows the layout to respond to drainage, geotechnical conditions and site boundaries. Axial says this can reduce grading, protect buildable areas and limit the civil work passed on to the EPC contractor.

Wind resilience starts with structural design

As rows get longer and structures use material more efficiently, their response to wind needs close attention. Moving a row to its stow position is only part of that response. The behavior of the full row matters, rather than the load at one isolated point. It must also remain controlled when pressure is uneven, gusts arrive or conditions differ along its length.

Axial combines its Multipoint Blocking System with stow strategies and wind monitoring. Wind-tunnel testing with CPP Wind Engineering Consultants examines torsional and aeroelastic behavior in gusting winds, which the blocking system is designed to control. The testing is used alongside site-specific load analysis. Software can trigger a response, but the steel, joints, drive and foundations must carry the forces that follow.

This goes beyond checking a design against a single wind-speed figure. Owners, lenders and insurers also need to understand how a tracker will cope with repeated weather exposure over years of operation. Clear load paths, tested components and engineering for the conditions at each site provide a better basis for that assessment.

Installation is part of product design

For EPC contractors, tracker costs are often measured in labor hours and tasks repeated thousands of times. Once modules and inverters have been procured, the balance-of-system and civil packages still offer opportunities to protect a project's levelized cost of energy (LCoE).

The design can make those tasks easier through standardized parts, simpler pile layouts and assembly steps that crews can repeat consistently. On Axial Twin, two rows share a single multi-drive line. That means fewer motors and control connections, and one commissioning point rather than two for the row pair. According to Axial, SlopeSync's tolerance for pile-driving variation can reduce the number of piles that need to be re-driven or corrected on uneven ground, a disruptive job for an EPC crew. Titan's rows, which extend up to 160 meters and carry four strings, can reduce the number of foundations and drives and simplify electrical infrastructure.

These are different ways of reducing the work required to build a plant. For a contractor, fewer repeated operations can also mean fewer points at which a delay or installation error can spread across the project.

A few minutes saved on a repeated installation step can add up across thousands of foundations, bearings and module connections. Repeatable assembly also makes it easier for different crews to follow the same process and can help commissioning progress more predictably.

The same thinking applies to operations & maintenance (O&M). Fewer parts and connections may mean fewer places where intervention is needed, provided that access, diagnostics and replacement have been considered from the start. The purchase price of a tracker is therefore only one part of its cost; the work it creates during construction and operation matters too.

Choosing the right solution for each project

No single tracker layout suits every project. The useful choice depends on the terrain, wind conditions, module configuration, labor market and construction plan. A longer row or a shared drive only helps if it makes sense for those conditions.

Axial One offers a standardized single-row design for large, uniform sites where a repeatable layout is useful. Twin shares critical components between two rows while accommodating uneven ground. Titan extends one row to serve up to four strings, making it an option for large, open sites where fewer foundations and drives can simplify construction and electrical infrastructure. These differences give project teams a choice based on the work the site demands.

Axial will exhibit at RE+ 2026 in Las Vegas from 17th to 19th November, at booths W15859 and W15865. For visitors comparing tracker designs, the question is how each arrangement affects the land preparation, installation work and long-term structural performance of their own project.

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About Axial

Axial Structural Solutions designs and manufactures solar trackers and fixed mounting systems for photovoltaic plants.

- More than 1,000 projects in over 40 countries
- 18 years' experience
- Axial Twin launched in 2020, using homokinetic technology to move two rows with one motor
- Axial Titan supports rows of up to 160 meters, with a design intended to improve adaptability and reduce ground impact